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COMMUNICATION AND COGNITIVE STRUCTURE

by

© WILLIAM RICHARD MULFORD

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ABSTRACT

The study reported in this thesis dealt with an investigation of the relationships that exist between administrative training, experience and personality variables, and the educational administrator's characteristics as a transmitter and receiver of communication. The associations among a number of measures of cognitive structure, and the manipulative tendencies of various educators, has also been examined.

Zajonc's (1954) conceptual scheme and research indicating that transmission and reception of information lead to the arousal of different cognitive structures formed the basis for the study. Groups of undergraduate education students, graduate students in educational administration, teachers, principals, and superintendents were experimentally prepared to either transmit or receive information. Following this experimental induction subjects completed Zajonc's various instruments measuring cognitive structure, Christie and Geis' (1970) Mach V scale of Machiavellianism, Bieri's (1963) Role Rep Test of dimensional cognitive complexity, and Tuckman's (1966) Interpersonal Topical Inventory of integrative complexity.

It was concluded that being involved in graduate training in educational administration was significantly and positively related to increased rigidity in a subject's cognitive structures when preparing to receive information.

[illegible]

Also, teachers were more rigid than administrators and principals were more rigid than superintendents when preparing to receive information. Increased teaching and administrative experience, however, was significantly and positively related to the possession of more flexible cognitive structures when preparing to receive information.

When preparing to transmit information superintendents were significantly more rigid in their cognitive structures than principals, whereas principals tended not to differ in cognitive structures from teachers. Increased Machiavellianism for teachers and principals was also significantly and positively related to the possession of more rigid cognitive structures when preparing to transmit information.

No significant relationship was indicated between Zajonc's and Tuckman's instruments of cognitive structure. However, a significant and positive relationship existed between Zajonc's Differentiation and Complexity measures and Bieri's Role Rep Test.

Significant differences were also found among the manipulative tendencies of various educators. Principals and superintendents had significantly lower and doctoral students in educational administration significantly higher Machiavellian scores than other educator groups.

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THE PROBLEM

I. STATEMENT OF THE PROBLEM

Shartle (1951) has stated that "communications appear to be one of the most important factors in administrative behavior (p. 132)." Administrators are recognized as occupying key positions in an organization's communication network (Barnard, 1938, p.215; March and Simon, 1956, p.165-7; Miklos, 1968, p.4; MacKay, 1963, pp.31-8; Dimock et al., 1961, pp.162-3). That administrators are thought to occupy major positions in an organization's communication network leads one to suggest that they may behave differently in communicative acts from other organizational members.

Differences in communicative behavior may not only occur between administrators and other organizational members, but also between administrators in different positions or even between administrators in similar positions. These communication differences could result from variations in administrator training, experience, perception, cognitive structure, and/or personality.

The problem examined in the present study involved an investigation of the relationships that may exist between administrative training, experience and personality variables, and the educational administrator's characteristics as a

transmitter and receiver of information.

II. IMPORTANCE OF THE PROBLEM

The Importance of Communication

A belief that the study of communication is worthwhile is supported by statements of authors in the general area of language and the specific field of administration.

All organized systems depend on communication. George Herbert Mead (1934, 1936) considered verbal communication to be the key to the growth of an individual's sense of "self." Language was regarded by Mead as the element of social organization which was responsible for the existence and growth of our uniquely human society. Communication and participation by means of vocal gesture constituted for Mead the underlying principle of human social organization.

Language has the capacity to represent experience in symbolic form; it permits us to perform a particular form of encoding. Krauss (1968) states that this simple fact has two important consequences: (1) we can encode experience via language and, because the symbols we use for such encodings have socially shared meanings, we can transmit our encodings to others (that is, we can communicate); and, (2) language plays a role in the operation of mental processes and is intimately connected with our competence as communicators.

Newcomb (1963), while making reference to two main aspects of communication, transmitting and receiving, argues further that successful socialization depends upon successful communication.

> Such is our dependence on one another, from the very beginnings of communicative experience, and such is our indebtedness to culture, which is transmitted via

> communication, that success in the enterprise of becoming socialized depends upon success in transmitting and receiving (p.303).

Numerous statements have been made over the years with respect to the importance of communication as it relates to administration and the administrator. Chester Barnard's (1938, 1956) theory of administration, for example, is interwoven with his theory of communication. He stated:

> If positions of communication are not manned by those of requisite general and special abilities, other than ability of position, disintegration of organization occurs slowly through failure to accomplish the aims of cooperation in ways that permit the satisfaction of the motives of the contributing individuals in the organization (1956, p.235).
>
> In an exhausive theory of organization communication would occupy a central place, because the structure, extensiveness, and scope of organization are almost entirely determined by communication techniques (1938, p.91).

Mansfield (1967) has reviewed the literature related to the importance of communication with respect to various aspects of human behavior--especially that behavior related to administration. His review stresses the importance of communication for organized systems, formal organizations, and administration.

Employing the works of Newcomb et al. (1965), Weber (1947), March and Simon (1956), and Ackoff and Rivett (1963), Mansfield first emphasizes that the concept of communication is essential to the functioning of all organized systems. Then, using the writings of Dubin (1961), Ackoff (1961), Knezevich (1962), Thayer (1961), Dorsey (1957-8), and Barnard (1938, 1956), he indicates that the formal organization's

foundation, effectiveness, and coordination all depend on communication. Finally, from the writings of Barnard (1938, 1956), Litchfield (1956-7), Green and Redmond (1957-8), Dorsey (1957-8), and Dimock et al. (1961), Mansfield points out that: (1) communication is the first function of the administrator; (2) a large amount of time is devoted to it; and (3) administration is communication, or communication is related to administration through such organizational characteristics as authority, decision-making, organizational adaption, specialization, behavioral rules, procedural specifications, impersonality, and technical competence.

March and Simon (1956), although stressing that communication is one of the least understood areas in administration, point out that few writers will question the importance "of the organizing of a communication structure within any situation (p. 82)." Thayer (1961) has suggested that "the ability to communicate is the most used, and the most usable--hence the most valuable--ability any administrator may exercise in his job (p. 3)."

A number of authors, among them Dorsey (1957-8, p. 315), March and Simon (1956, p. 168), Simon (1959, p. 158), and Thayer (1961, p. 249), have mentioned their own belief in the importance of oral communication because of the corrective benefits of feedback. However, these authors tend to stress the transmitting aspect of communication rather than the receiving aspect. This emphasis on transmission in the literature is unfortunate for as Roethlisberger (1961) maintains, "the

biggest block to personal communication is man's inability to listen intelligently, understandingly, and skilfully to another person (p.243)." Similarly, Rogers (1961) has stressed the need for the transmitter to consider the receiver's frame of reference and vice versa. Wiksell (1960, p.86), too, has emphasized the need for the receiver to have a receptive attitude. Culbertson (1959) points out that an administrator who does not grasp the implications of these communication fundamentals will impair organizational effectiveness. Therefore, variations in ability to master communications skills are of vital importance for the administrator.

The Importance of Personal Characteristics in Communication

Personal characteristics associated with communications skills may be, in line with the preceding reasoning, related to administrator effectiveness. Erickson and Pedersen (1966) relate several of the administrator's personal characteristics to inept transmission and reception of information:

> Particularly relevant to coding discrepancies is the leader's ability to transmit and receive verbal and nonverbal signals correctly. Some low-communication executives may lack verbal skills. They may mangle the language so badly that few people are able to understand them. Other school officials may be so insensitive perceptually as to ignore and misread the subtle verbal and nonverbal cues through which teacher attitudes are telegraphed . . . . Still other functionaries seem oblivious to their own nonverbal statements . . . . We know very little about this aspect of sentiment sharing (pp. 2-3).

Cantril (1947) has suggested that our perceptions depend in large part on the assumptions we bring to a particular occasion. In the same vein, Thayer (1961) has suggested

that the effectiveness of communication will depend on the thinking, attitudes, and techniques of the administrator. Culbertson (1959) maintains that "an analysis of the motivators and values which the communicatees hold can also provide clues for more effective and hence better administration (p.4)."

Hochbaum (Harris, 1963) has summarized a number of personal characteristics as they apply to administrator transmitting and receiving behavior:

> In short, communications tend to be perceived and interpreted by a recipient in terms of his own stereotyped perceptions, his own needs, and his own desires. In order to assure effective communication, then, one must know and take into account the needs and problems, motivations and fears, customs and norms of the people to whom one is trying to communicate and then adjust the form of communication to their cultural milieu. We give frequent lip-service to this principle, yet may become too engrossed in our own ideas as communicators that inadvertently we judge the likely success of our messages in terms of our own reaction to them. Hence, we may fail to consider the possibility that the people in our intended audience may react quite differently because they look at the subject from a different point of view (p.247).

An examination of items selected for questionnaires that attempt to measure leader opinion, behavior, and effectiveness, and the definition of factors obtained from these same questionnaires, emphasizes the importance placed by the authors on communication in the study of leadership as it applies to administrators. For example, two items from the Leader Behavior Description Questionnaire, two items from the Leader Opinion Questionnaire, and two factors from Hemphill's (1964) study of principal leadership are, respectively, "He tries out his ideas in the group" and "He is a persuasive

talker;" "Speak in a manner not to be questioned" and "Talk about how much should be done;" and, "Exchanging Information" and "Discussing before Acting."

If it is accepted that communication is an integral part of leadership, then the emphasis in leadership literature on the need to consider personality offers further support for the importance of personal characteristics in a study of communication. Stogdill (1947), Mann (1959), and Clifford and Cohn (1964) all concur that personality variables do have a part to play in the understanding of leadership. Hemphill (1964) states that "the style of administration of a principal may be understood in part as an expression of measurable personality characteristics (p.198)."

The Importance of Cognitive Structure in Communication and Administration

One personal characteristic that appears to have considerable importance not only for the study of communication, but also the study of administration in general is that of cognitive structure. Newcomb and his associates (1965) have emphasized that "encoding and decoding complex messages are necessarily carried out in terms of whatever cognitive structures the communicators have already developed (p.190)." In addition, Thayer (1961, p. viii) claims that there is every reason to suspect a strong relationship between the effectiveness of an administrator's communication and the effectiveness of his thinking.

In her summary of the literature relating cognitive

structure and creativity, Renner (1968) points out that there is considerable evidence that cognitive structure and certain personality characteristics go hand in hand.

> For example, persons who have developed complex cognitive styles [structures] have been found to possess more self-sufficiency, initiative, achievement orientation, introspection, perceptual and cognitive independence, tolerance for ambiguity and risk-taking habits than do those whose cognitive style places them at the simple end of the continuum. Further, it would appear that the personality characteristic attributed to individuals with complex cognitive styles are much the same as those which have been used to identify the creative individual (p.1).

If it is agreed that variables, such as, creativity, self-sufficiency, initiative, achievement-orientation, introspection, tolerance for ambiguity, and risk-taking, which are positively correlated with cognitive structure, are important or even desirable characteristics of administrators, then the study of the construct itself is also important.

Katz and Kahn (1967) have commented on the difference in conceptual ability among individuals in an organization.

> Everyone who has lived the organizational life has experienced the differences among individuals in their ability to see, conceptualize, appraise, predict, and understand the demands and opportunities posed to the organization by its environment (p.313).

But they add:

> Yet the intellective aspect of leadership has been neglected in research (p.313).

This last statement has immediate relevance when one realizes the emphasis placed on the cognitive dimension in the selection of administrators. For example, the criteria developed, after a thorough study of available research, in the selection of principals for a special two-year training

programme for educational administrators at the University of Chicago stressed the ability to organize, the ability to direct the efforts of other people, and a high degree of intellectual ability (Campbell, 1959).

Research

The preceding statements underline the need for empirical analysis of the relationship between administration and communication. However, these and other statements also suggest that there is a paucity of research into this relationship, especially within the context of educational administration. One such statement is that by Thayer (1961):

> Little attention has been given, at least in the applied fields, to the kinds of research that would produce more basic understanding of the communication process and how it relates to successful administrative behavior (p.260).

According to Costello and Zalkind (1962, pp.218-9), the behavioral sciences, while emphasizing such matters as group dynamics and decision-making, have not yet given sufficient emphasis to researching the process of perception. They concluded that "one of the important tasks of administrative science is to design research to test various training procedures for increasing perceptual accuracy (p.260)." Given the conclusion by Eisenson et al. (1963, p.138) that without perception there could be no communication, Costello and Zalkind's statement has direct relevance for communications research.

At a broader level than administration, but dealing specifically with the educational organization, Bidwell (1965)

has pointed out that the findings about school organizational structures, processes, and environment contain "serious gaps--most notably the absence of studies of communication in school systems (p.993)."

A number of research projects underline the importance of both communication in administration and the influence of personal characteristics on communication and on administration. Guetzkow [Shartle] (1951), after extensive studies concerning leadership, concluded:

> Communications appear to be one of the most important factors in administrative behavior. Where more communications are reported present, there is less discrepancy between description of the administrator and description of ideal behavior as reported by subordinates (p.131).

Similar conclusions were reached in the educational context in three separate leadership studies by Bidwell (1955), Chase (1953), and Moyer (1953). Research quoted by Pierce and Merrill (1957, pp.341-2), which examined elementary and high school principals' effectiveness, indicated a significant positive relationship between teachers' perceptions of the principal as administratively effective and their perception of him as a good communicator.

A number of studies have indicated that administrators spend a great deal of their time engaged in some form of communication. Burns (1954) reports that managers spend eighty per cent of all their time at work talking to others. Lawler <u>et al</u>. (1968 , p.435) found that eighty-nine per cent of the communication episodes of the managers in a manufacturing company and eighty-two per cent of the episodes of the

managers in a social service organization involved verbal communication.

Research by Anderson and Van Dyke (1963, pp.532-3) in the educational context tends to agree with Burns' and Lawler, Porter, and Tennenbaum's findings. High school principals were found to spend nearly sixty per cent of their time involved in communication. Most of this communications time was face-to-face with subordinates, particularly teachers. Similarly, the studies carried out by Flanders (1960) suggest that teachers spend a great deal of time involved in communication. The general pattern that emerged for teachers indicated that twenty-five per cent of total classroom time was spent on lecturing, twelve to twenty-four per cent on the giving of directions and of criticism, and three to eight per cent on accepting of pupil's feelings, praise, questioning, and the use of pupils ideas.

Sieber and Lanzetta (1964) have studied the effects of cognitive structure as a determinant of decision-making behavior. They found that cognitively complex persons seek more information and take more time before reaching decisions than cognitively simple individuals. In a different context, Hemphill (1964) has summarized the results of research on what the "able and well-regarded" principal does: "he works at organizing preparations for his decisions (p.194)." A combination of Sieber and Lanzetta's and Hemphill's findings serve to highlight the relevance of personal characteristics, particularly cognitive structure, for administration in

general .

Findings from Prince's (1957) study, in which it was discovered that congruence of values between principals and teachers was directly related to the teacher's confidence in leadership and to the teacher's rating of the principal's effectiveness, again serve to emphasize the importance of personal characteristics in the study of administration. However, this similarity in cognitive structures has also been shown to be related to effective communication. Guetzkow (1965) has commented on this "categoric similarity" and its effect on communication:

> Perhaps as facinating is the impact in accuracy in communication of the very cognitive dimensions in terms of which messages are generated and received, ... Triandis' study (1959) in industry of "categoric similarity" found that boss-subordinate pairs could communicate more effectively when they similarily categorized particular people . . . when responding to an adaption of Kelley's (1955) Role Repertory Test. This work was replicated in the laboratory, in which dyads of students were found to communicate better with each other in a game situation when their previously measured categorizations of attributes were more similar (Triandis, 1960). This same finding had been obtained earlier by Runkel, using Coomb's "unfolding technique," in a classroom situation. Runkel (1956) found students received higher grades on quizzes when their responses to the contents of their introductory psychology course were "mediated by the same underlying attribute" as were their instructors'. The higher grades for students who were cognitively similar to their teachers "could not be accounted for by differences in scholastic ability as measured by A.C.E. scores, nor by conformity to a common attitude norm, nor by preference for the same attitude position as that held by the teacher" (p.191).

Summary

In summary, authors in both the field of social psychology and the applied field of administration indicate that: (1) the study of communication, especially in the

administrative context, is important; (2) the study of personal characteristics within the field of communication is important; and, (3) among personal characteristics an individual's cognitive structure appears to have importance for both the study of communication and the study of administration in general.

Research that has been carried out has, in the main, only served to underline the importance of the subject. Specifically, it has been shown that (1) administrators spend a considerable portion of their time involved in communication and that (2) effective administration is significantly and positively related to effective communication.

Other research has served to support the importance of personal characteristics, especially an individual's cognitive structure, for both the study of communication and the study of administration. An individual's cognitive structure appeared to be related to effective communication and effective administration.

Overall, however, the kinds of research that would produce a more basic understanding of the communication process as it involves administrators still appears lacking. An urgent need thus exists for educational administration to conduct research which will shed more light on the nature of administrator's communicative behavior. Ideally, such research should, as Lambert and Lambert (1964, p.33) point out, concern itself with both transmission and reception.

III. DEFINITION OF TERMS

Definition of the major concepts employed in this study is undertaken within the context of the latter discussion, especially that accompanying the literature review and development of hypotheses. Definitions for the particular usage of most frequently cited terms are set out in the following glossary.

Communication. This is the conscious or unconscious, intentional or unintentional transmission and reception of information, meaning or stimuli using symbols or message systems.

Perception. This refers to ". . . the individual's organization of sensory input--that is, what he does, psychologically, with the stimuli currently impinging upon his sense organs (Newcomb *et al*., 1965, p.34)."

Machiavellianism. This is a measure of manipulativeness and utilitarianism (Christie and Geis, 1968). In descriptive terms, Machiavellians are manipulators who tend to use people for their own purposes. They are more concerned with means than ends, are not concerned with morality in the conventional sense, and are "cool" in interpersonal relationships. Once one becomes emotionally involved with another person it becomes difficult to treat them as an object to be manipulated. Machiavellians tend to be overly rational in dealings with others.

The following definitions are pertinent to the research method employed in this study. With only minor adjustments being made, they have been taken virtually

verbatim from Zajonc (1960, pp. 159-61).

Attributes. The qualities or characteristics that individuals "assign" to objects and events.

Cognitive universe. The set of all such attributes which an individual had at his disposal to identify and discriminate objects and events in his environment.

Cognitive structure. An organized subset of the given cognitive universe in terms of which the individual identifies and discriminates a particular object or event. The morphological properties of cognitive structures--differentiation, complexity, unity, and organization--describe various relationships among attributes.

Degree of differentiation. The number (n) of attributes constituting a given cognitive structure reflects its degree of differentiation (D).

Degree of complexity. The attributes constituting a given cognitive structure may come from a single class or category of discriminanda, or they may represent many categories. Attribute groupings may be further subdivided into smaller classes, and the extent of such subdivision may be used in defining the complexity of cognitive structures. Algebraically:

$$C = \sum_{r=1}^{n} r n_r$$

Where *r* is the level of inclusion of a given class such that if the class K_i does not include another subclass, *r* = 1; when K_i includes some subclasses, which in turn do not include other subdivisions, *r* = 2; when K_i includes subclasses which themselves contain other subclasses, *r* = 3, and so on. In addition, n_r is the number of attributes in the *r*th level of inclusion.

Degree of unity. Structural components depend on each other to a greater or lesser extent. The more attributes depend on each other the more the cognitive structure is said to be unified. If we define the dependence of the attribute A_i on the attribute A_j as equal to 1 when a change in A_j produces a change in A_i, and as equal to 0 when change in A_j does not produce a change in A_i, then a dependency matrix can be constructed for all attributes of a given cognitive structure, and the total dependency of each attribute may easily be obtained by summing the entries in the appropriate row. To compare the unity of structures of different degrees of differentiation, the measure of unity must be normalized. Given a structure with *n* attributes, the maximum dependency of a given attribute, dep $(A_i)^{max}$ is equal to *n*-1, and the maximum sum of dependencies in the cognitive structure is *n*(*n*-1). Thus, algebraically:

$$U = \frac{\sum_{i=1}^{n} \text{dep } (A_i)}{n(n-1)}$$

where dep (A_i) is the total dependency of the *i*th attribute.

Degree of organization. To the extent that one part or cluster of parts dominates the whole, the whole is said to be highly organized. Taking the determinance of the strongest attribute, det $(A_i)^{max}$, from the appropriate column of the dependency matrix, and dividing it by the unity of the cognitive structure obtains a measure that reflects the degree to which the interdependence among the attributes is concentrated around a single core. Thus, algebaically:

$$O = \frac{\text{det } (A_i)^{max}}{U}$$

Cognitive tuning. When a person primarily anticipates receiving information, he may be expected to activate a cognitive structure capable of admitting the incoming information. On the other hand, anticipation of transmitting information should activate structures that may serve as a source of potential messages. These two processes may be termed "receiving tuning" and "transmitting tuning."

Group designation. Groups "tuned" to transmit are called T-groups; groups "tuned" to receive are called R-groups.

IV. ORGANIZATION OF THE THESIS

After stating the problem, this chapter has served to stress the importance of communication, personal characteristics in communication, and cognitive structure in communication

and administration. To conclude the chapter, definitions of the major concepts employed in the study were undertaken.

In Chapter Two, literature pertaining to the major variable in the study, cognitive structure and its attendant complexity, is presented. The definition, measurement, and generality of the cognitive complexity construct is analysed. Situational factors that effect cognitive complexity, particularly environmental complexity and transmitting and receiving tuning, are presented and the relationship of cognitive complexity to education is discussed. Following this literature review, hypotheses pertaining to the problem stated in Chapter One are developed.

Chapter Three provides a description of the research design employed in the study. After a brief outline of the sample, the research methodology is presented in terms of the experimental induction of cognitive tuning and the required demographic and personality data. Following discussion of the research methodology, the statistical analysis of data is provided. Finally in Chapter Three, the limitations, assumptions, and delimitations of the design are listed and a brief overview of the results of a pilot study are indicated.

Chapter Four provides a description of samples and the results of analyses comparing (1) intact groups and (2) samples and populations. Chapter Five is devoted to the testing of hypotheses. Where hypotheses are not supported, further analysis is reported in an attempt to explain discrepancies.

Chapter Six presents the results of a posteriori tests examining subjects' cognitive structure scores by selected demographic variables, the relationships among various measures of cognitive structure, and subjects' Machiavellian scores and possible predictors of these scores.

The final chapter, Chapter Seven, serves to summarize the study, offer conclusions, and provide a discussion of results and general conclusions. A number of implications for education in general and social psychological research are indicated.

CHAPTER II

LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

The purpose of this chapter is first to present a review of literature pertaining to the major variable in the present study, cognitive structure, and then to develop hypotheses relating to the problem identified in Chapter One.

I. COGNITIVE STRUCTURE

Newcomb *et al.* (1965), as already indicated, maintain that "encoding and decoding complex messages are necessarily carried out in terms of whatever cognitive structures the communicators have already developed (p. 190)." Runkel's (1956) research verified this position. In fact, consideration of these cognitive structures led Bruner (1964) to theorize that perception involves an act of categorization. He has asserted his belief that, as perceptual experience is the end product of a categorization process, "it is evident that one of the principal characteristics of perceiving is a characteristic of cognition generally (p. 226)."

In relation to perceptual and cognitive structures, Krech and Crutchfield (1947) assert that all of man's behavior, including communication, is shaped by his private conceptions of the world. Shaw and Costanzo (1970) suggest that the major viewpoints of Krech and Crutchfield's theory can be subsumed under the general proposition that "behavior is organized,

that this organization is molar, and that the most important element in this organization is cognition(p. 187)."

One characteristic of cognitive structure which has received growing attention from psychologists (educational, social) has been that of cognitive complexity. In what follows, the definition, measurement, and generality of the cognitive complexity construct are analysed. Situational factors, particularly environmental complexity, transmitting tuning, and receiving tuning, that affect cognitive complexity are presented. The relationship of cognitive complexity to education is also discussed.

Definition and Measurement.

Definition. Bieri (1966) developed the concept of cognitive complexity as an "information processing variable which enables us to predict how an individual transforms specified social stimuli into kinds of social or clinical judgements (p. 15)." In Bieri's view, cognitive complexity is the result of either a great number of dimensions, or a great number of differentiations upon dimensions along which the social environment may be perceived. Similarly for Scott (1962), cognitive complexity is defined as a function of the distinct frames of reference. Expanding upon Bieri's and Scott's conceptualization, Schroder et al. (1967) maintain that cognitive complexity consists of two components:
(1) the number of dimensions used for interpreting input, and
(2) the schemata (integrative rules) governing the relations among dimensions. Crockett (1965, p. 49) contends that a

cognitive system may be considered complex when it contains many elements and when the elements are integrated to a relatively high degree. Harvey (1966) considers this integrative aspect of cognitive complexity to be an essential condition of cognitive structure, as does Tuckman(1966).

In many cases where cognitive complexity has been utilized or discussed, a characteristic more narrowly ascribed as *dimensional complexity* has been referred to or measured. A level of dimensional complexity is judged with reference to the plurality of dimensions along which objects or persons are perceived or take on meaning. This dimensional approach has received its main impetus from the work of Bieri (1955, 1961, 1966, 1968).

A second characteristic, *integrative complexity*, has been forwarded as a description of differences in the way dimensions of information or cognitions are combined. This approach springs from the theoretical structure of Harvey and his associates (1961) who tend to emphasize the integrative function associated with complexity levels, rather than the differential or dimensional aspects. As Harvey *et al*. (1967) state:

> Concreteness-abstractness, as we have characterized and validated the construct, refers to a superordinate conceptual dimension encompassing such more molecular organizational properties as the degree of differentiation, articulation, integration, and centrality of the cognitive elements (p. 205).

Harvey *et al*. (1961) have identified four major systems of functioning along the concrete-abstract dimension. They also deduce several intermediate stages which are

admixtures of the major systems, but which are related to the progression. The more concrete the conceptual functioning, the more dependent it is upon the physical attributes of an activating stimulus. As movement towards abstractness occurs, there is an increased multiplicity of alternative concepts available for coping with the same stimuli.

System One is characterized by the most concrete mode of relating to and ordering of events. Behavior appears to be the result of stimulus-response conditioning, trial and error learning, and adherence to rules and values without understanding. Individuals functioning at this level exhibit tendencies toward superstition, high religiosity, conventionality and ethnocentrism, high absolutism and closeness of beliefs, and high positive ties with and dependence upon institutional authority. It is assumed that these individuals have been restricted in the exploration of values, power relationships, and social causality, while subjected to imposed standards of parents and/or other authorities.

A somewhat more abstract mode of functioning exists at the System Two level combined with a rejection of traditional authority structures. Individuals tend to be alienated from society as a result of rejection of cultural norms and mores, and avoidance of dependency on various forms of institutional authority. They may additionally have deep feelings of distrust and uncertainty. It is thought that this system evolves as the result of experience with authority figures who capriciously manipulate rewards and punishments

in unpredictable fashions so that as a child the individual was always unsure of the course of action that would minimize chances of punishment and rejection.

Representatives of System Three operate at a higher level of abstraction. They are characterized by both inflated notions of esteem and social power as well as a feeling of inability to cope with problems except by the control of others. They tend to become preoccupied with establishing friendships, intra-group consensus, and dependency relations in order to avert the feeling of helplessness and social isolation that would result from being forced to be on their own. System Three individuals are assumed to develop in an atmosphere of over-protection and over-indulgence, which prevents them from exploring their physical surroundings. Rather, they learn how to manipulate others. Thus, individuals functioning at the System Three level can affect desired outcome by manipulating others.

System Four is the most abstract of the various systems. Individuals operating at this level generally have a high task orientation, are highly independent, are inclined to be risk-takers, and tend to engage in information seeking and exploratory behavior. These characteristics are seen to be the result of childhood freedom to inquire into the social and physical world and to arrive at conclusions without concern about deviating from established truth. System Four, then, is characterized by highly differentiated and integrated cognitive structures.

Measurement. Just as there has been uncertainty and lack of consensus associated with a definition of the construct of cognitive complexity, there has also been a measurement problem. The few studies that have sought relationships between and among the numerous measures of cognitive complexity have indicated a lack of consistent findings. Little consensus has been reached regarding the most appropriate instrument. Each researcher in the area seems to rely exclusively upon his own test which has seldom been validated against other existing tests.

Research in the dimensional complexity area has employed measures which infer the subjects' level of complexity from behavior on tasks which require sorting stimuli into groups on the basis of underlying perceived similarities, or making similarity judgements between given sets of stimuli. Complexity is then inferred from the multiplicity of dimensions which are used to evaluate concepts in the stimulus area. Scott (1962, p. 407), for example, asks subjects to sort lists of nations, which subjects generate themselves, into groups "which belong together." He suggests that complexity is then arrived at by simply measuring the number of distinctions made between and among the nations.

Other researchers in the area of dimensional complexity have used an instrument developed by Kelley called the Role Construct Repertory Test (Rep Test) or variations of it (Bieri, 1961; Lundy and Berkowitz, 1957; Nidork and Crockett, 1965). Subjects employing Kelley's test generate

a list of interpersonal stimuli and consider them in groups of three on the basis of the way two of them differ from the third. Knowledge of the basis on which these similarity judgements are made allows the researcher to credit any one subject with a bank of constructs which are inferred to be those which the subject uses to make judgements about interpersonal concepts. Constructs or dimensions which are similar to one another are noted by their similar check patterns on a grid which contains all stimuli.[1]

Tuckman has developed the Interpersonal Topical Inventory (ITI) for his research in the area of integrative complexity.[2] Subjects using Tuckman's test are classified into one of the four conceptual systems outlined by Harvey (Supra, pp. 23-4) as a result of their responses in comparing thirty-six pairs of statements. Of the seventy-two alternatives, eighteen fall into each of the four increasingly cognitive complex systems. To accomplish the same end as Tuckman, Harvey used a semiprojective device known as the This I Believe Test (TIB), but recently he has devised Conceptual Systems Test (CST) which is an objective measure. For Schroder and his associates, there is the semiprojective Paragraph Completion Test (PCT) and an Impression Formation Test (IFT) which involve careful coding of paragraphs written in response to sentence stems such as "When I am in

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[1]Bieri's variation of the Rep Test is described in detail in Chapter Three.

[2]The ITI is described in detail in Chapter Three.

doubt . . .," or written impressions of persons who have been described by a list of adjectives. However, Tuckman's ITI was designed as an objectively-scored replacement for Schroder's measures.

Few consistent relationships have been found among the various measures of cognitive complexity. For instance, Scott (1963) observed that his Groups of Nations Test probably has little relation to the Rep Test employed by Bieri (1966). Vannoy (1965) found that Schroder's Sentence Completion Test which measures the level of integrative complexity was not highly correlated with other measures of cognitive complexity (including the Bieri Rep Test of cognitive complexity, the F Scale, the Intolerance of Ambiguity Scale, and the modified Scott test of cognitive complexity). Vannoy (1965) suggests that the reason why other measures do not correlate significantly with Schroder's test may be because they are, basically, measures of dimensional complexity, and, as Vannoy emphasizes, dimensional complexity is a necessary _but not sufficient condition_ of integrative complexity.

Is there a relationship between the dimensional and integrative aspects of cognitive complexity? Recent leading proponents of the integrative approach, Schroder _et al_. (1967), assert that:

> . . . the number of dimensional attributes of information perceived has only a low-order relationship to the level of information processing involved . . . . A person using two dimensions may be able to use them cojointly, combine them in different ways, and compare outcomes, while a person using three dimensions may use them independently in a compartmentalized way . . . . [G]iven complex combinatory rules, the potential for generating new attributes of information is higher, and the degree to which one stimulus can be discriminated from another is increased as the number of perceived dimensions increases (pp. 14-15).

However, Bower (1969) maintains that Schroder and his associates have provided little empirical evidence to either clarify the nature of the rules involved in integration, or show that individuals at different stages of cognitive complexity actually differ in rule utilization or formation. Bower's (1969) own study "offered only tentative support for Schroder's position (p. iii)."

Gardiner (1968, pp. 68-72) found that the result of forcing a number of measures of cognitive complexity into two factors in a varimax rotation factor analysis was to transfer measures of cognitive dimensionality (for example, Scott's Groups of Nations Test) into the factor previously represented by measures of integrative complexity (for example, Tuckman's ITI). This last result suggests that dimensional and integrative complexity do have something in common.

Zajonc's schemata. Given these varying approaches to the definition of cognitive complexity and the inconsistency across measures, it appears desirable to search for (or develop) conceptualization and instrumentation which is more comprehensive than current schemata. Zajonc's conceptualizations and tests of cognitive structure appear to provide this comprehensiveness. With its main emphasis on morphological description, Zajonc's schemata is consistent with the generalization arising from the above descriptions of cognition and perception that cognitive structures represent organized systems whose natures depend on the various interrelations among their components. The organized systems, or properties,

that Zajonc (1954) employs are differentiation, complexity, unity, and organization. Each morphological property describes various relationships among "the qualities or characteristics that individuals 'assign' to objects and events(p. 159)."

> The number of such qualities enumerated [from a subject describing a stimulus object, namely, another person] constituted the measure of differentiation. Complexity was measured by having the S organize the attributes he listed into meaningful groupings and subgroupings, which served as a basis for assigning weights reflecting the respective levels of inclusion. Both unity and organization were computed from S's ratings of dependencies among attributes they listed. Unity was scored by summing the dependency ratings among pairs of attributes, and, as required by the definition, dividing the sum by the maximum possible sum of dependencies. Organization was measured by finding for the given cognitive structure the attribute on which the greatest number of other attributes depended, taking its determinance score (i.e. simply the number of attributes that were rated as depending upon it) and dividing it by unity (p. 160).

Conceptually, Zajonc's differentiation and complexity properties appear to parallel Bieri's criteria for dimensional complexity: a great number of dimensions and a great number of differentiations upon dimensions. On the measurement side, Zajonc's Complexity measure, because of its emphasis on groups or differentiations upon dimensions, appears the closest of the morphological properties to Bieri's adaption of the Kelley Rep Test.

On the other hand, Zajonc's concept and measure of Unity appear to be more consistent than the other properties with integrative complexity.[3] Conceptually, Unity and

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[3]The pilot study results indicated this tendency; the ITI score (a measure of integrative complexity) and Unity were significantly and positively correlated ($r = .23$, $p < .10$) in one of the groups tested ($N = 40$).

integrative complexity are both concerned with dependencies or relationships among a given number of dimensions. On the measurement side, Unity is the only property to reflect the relative as opposed to the absolute nature of integrative complexity. In fact, it would appear that Zajonc's test of Unity measures integrative complexity more directly than current tests. The Unity measure asks subjects to actually indicate dependencies among dimensions, a one step procedure, whereas Schroder et al. (1967), Harvey (1966), and Tuckman (1966) all assume that agreement with a stated behavior reflects varying amounts of integrative complexity, a two step procedure.[4]

Zajonc's (1955) various measures of cognitive structure, which appear to involve both the dimensional and the integrative aspects of cognitive structure, have been shown to relate significantly to one another. When the results of his measures of Differentiation and Complexity were plotted together for his validation study and his two experiments, a definite monotonic function was indicated (see Figure 1); as Differentiation increased so did Complexity.

Zajonc (1955, pp. 181, 185) also found significant monotonic relationships between his measures of Organization and Differentiation and his measures of Organization and Complexity. However, the relationship between the "best" measure of integrative complexity, that is, Unity, and the other morphological properties was not provided.

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[4]In an attempt to tie Zajonc's tests in with the current measurement trends, Bieri's adaption of the Kelley Rep Test and Tuckman's ITI were also employed in the present study.

	F	P
Valid.	37.31	$< .001$
Exp. I	12.53	$< .001$
Exp. II	15.18	$< .001$

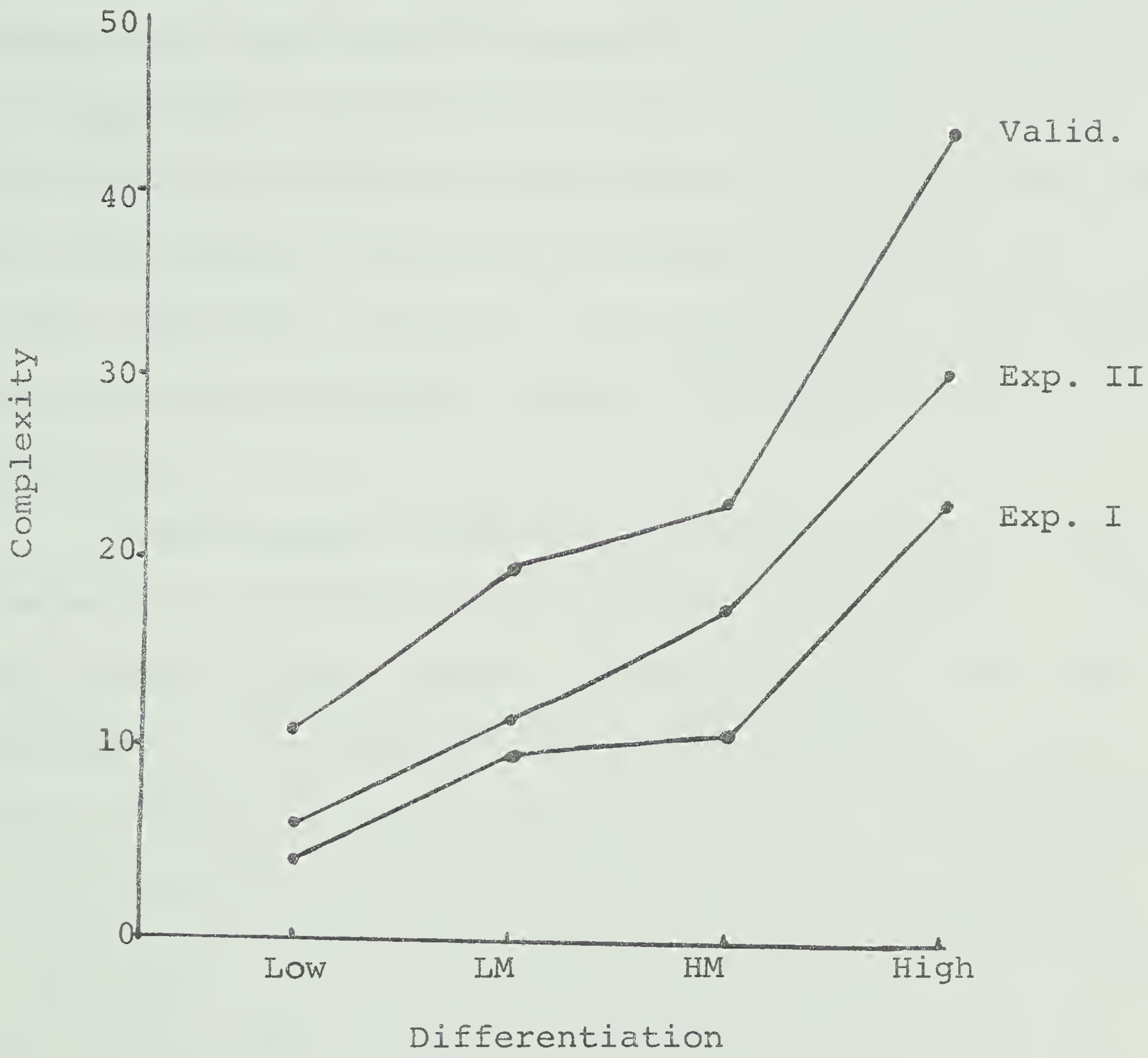

Figure 1. Degree of Complexity for Increasing Differentiation (from Zajonc, 1955, p.178, Table VI).

<u>Generality</u>

The assumption made by many authors in the area of cognitive complexity seems to be that the construct is a trait or an ability which is generalized in its operation across a range of stimuli or subject matter. In discussing the possible application of his descriptive scheme, Zajonc (1954, pp. 163-4) suggests that some evidence already exists to indicate that it <u>is</u> applicable to different types of objects. His work, which employed inanimate visual objects, an ideational object, and other varied objects such as spoons, ashtrays, the United States, communism, democracy, the experimenter, and subjects themselves, has produced a strong indication of consistency of patterns.

Nevertheless, Zajonc is not adamant about the ability to generalize the construct of cognitive complexity. Along with Schroder <u>et al</u>. (1967), he tends to favor the view that complexity is not necessarily a consistent general trait which affects the processing of information in all areas encountered by the individual. Scott (1963) focuses his research on the perception of a specific class of reality in order to escape the view of those who would postulate a unitary trait of cognitive complexity; he deals with complexity as it affects nation perception (Groups of Nations Test). Bower (1969) also suggests, as a result of his study, that "cognitive complexity is not a general factor but domain specific (p. 87)."

Not only may cognitive complexity be domain specific, but results using various purported cognitive complexity

measures indicate that it may also be trait specific. The results of Vannoy's (1965) factor analytic study of a number of measures of cognitive complexity definitely suggest that this characteristic "is not as general a trait as has sometimes been implied in the literature (p. 394)."

In another sense, cognitive complexity may be affected by the context of the stimulus domain, for example, by stress. Schroder et al. (1967) state that they "strongly support the view that the level of information processing is an interactive consequence of dispositional and conditional factors (p. 29)."

Thus, there appear to be at least three different areas across which the generality of the cognive complexity construct can be questioned, that is, across domains (stimuli), traits, and situations.

Situational Factors and Cognitive Complexity

The present study examines the hypothesis that conditional factors, or situation(s) a subject has experienced, affect his cognitive structure. The situations referred to in this study are, on the one hand, the administrator's training and experience and, on the other, whether he is preparing to transmit or receive information. This position assumes that cognitive structures are learned. Several authors do in fact suggest that a large part of an individual's cognitive structure depends on organization acquired through experience (Barron, 1963; Hebb, 1949; Werner, 1948). On the other hand, it is possible that an individual's level of

cognitive complexity will determine to some degree selection of, or behavior in, certain conditions.

Environmental complexity. Crockett's (1965) "frequency of interaction hypothesis" states that the level of an individual's cognitive complexity (dimensional complexity) increases with the variety of behavior settings he enters and the number of performances he has in these settings. Research cited by Crockett (1965) and Wicker (1969) supports this hypothesis. Schroder et al. (1967) have demonstrated that the degree of environmental complexity appears to be central in the development of conceptual (integrative) complexity. Overly simple environments which fail to provide sufficiently diverse or numerous dimensional units of information, fail to stimulate the process of integration. Other factors, not necessarily referring to the number and the complexity of information units, but which affect the mediating processes and hence the output, relate to structural effects induced by previous training situations. Schroder et al. (1967) provide an example:

> . . . "deductive" (unilateral) training, in which the trainer presents the rule for the trainee to practice, oversimplifies the environment, while accelerated training and the presentation of overly complex environments prohibit the evolvement of combinatory rules [integrative complexity] p. 32).

Harrison (1966) and Sobel (1970) have both indicated that cognitive structure can be changed by participation in a sensitivity training experience. Harrison states:

> Our hypothesis that significant changes in concept usage are due to active involvement in the training process is supported by the significant correlations between participation ratings and conceptual changes. Those who

> are seen as seeking, facilitating, and using the feedback of other's feelings and perceptions toward themselves, tend to change more toward the use of inferential-expressive concepts (away from concrete-instrumental) (p. 520).

Bodden's (1970) research indicates a tentative but positive relationship between a person's cognitive complexity and choice of more complex occupations. Schroder is more concerned with the behavior of individuals of varying degrees of complexity. What Schroder et al. (1967, pp. 36-41) hypothesize and then provide some evidence to support, is that: (1) information processing by "people in general" (individual differences disregarded) reaches a maximum level of structural complexity at some optimal level of environmental complexity from which point increasing or decreasing environmental complexity lowers the conceptual level; (2) individual differences in the level of integrative complexity of information processing may be expressed as a family of inverted U curves, with individual differences in conceptual level progressively decreasing as the environment becomes more extreme in either direction from their respective optimal points; (3) compared to the inverted U curve for integratively simple structures, that for complex structures (a) is always higher over the mid ranges of environmental complexity and equal at the extreme ranges of environmental complexity, and (b) reaches its optimal point at higher levels of environmental complexity.

Ten groups of four low and ten groups of four high cognitively complex (cognitively integrated) persons of equal

intelligence were compared by Schroder et al. (1967, pp. 150-2) over different information-load conditions. Comparisons were made in terms of the number of integrations involved in decision making in a complex, competitive strategy task. The results are presented in Figure 2. They lend support for Schroder's hypotheses. Further support for the hypotheses was found in a similar experiment by Streufert, Graber and Schroder (1964). In this latter experiment, seven groups of four concrete subjects were compared with seven groups of four abstract subjects in terms of the total number of simple and complex perceptual responses made by individuals on a questionnaire administered over seven different information load periods in a tactical game situation. The results were consistent with Schroder's hypotheses; specifically, those with the more abstract structures were concerned with long-term strategies, with taking the "enemy's point of view" into consideration, and with being sensitized to a broader range of information.

In summary, the data relating cognitive and environmental complexity indicates that: (1) cognitive complexity tends to increase as environmental complexity increases; (2) the more cognitively complex individual tends to seek the more complex situations; and (3) cognitively complex individuals require more complex information than cognitively simple individuals to reach their optimal effectiveness when processing information.

Transmitting tuning and receiving tuning. In the

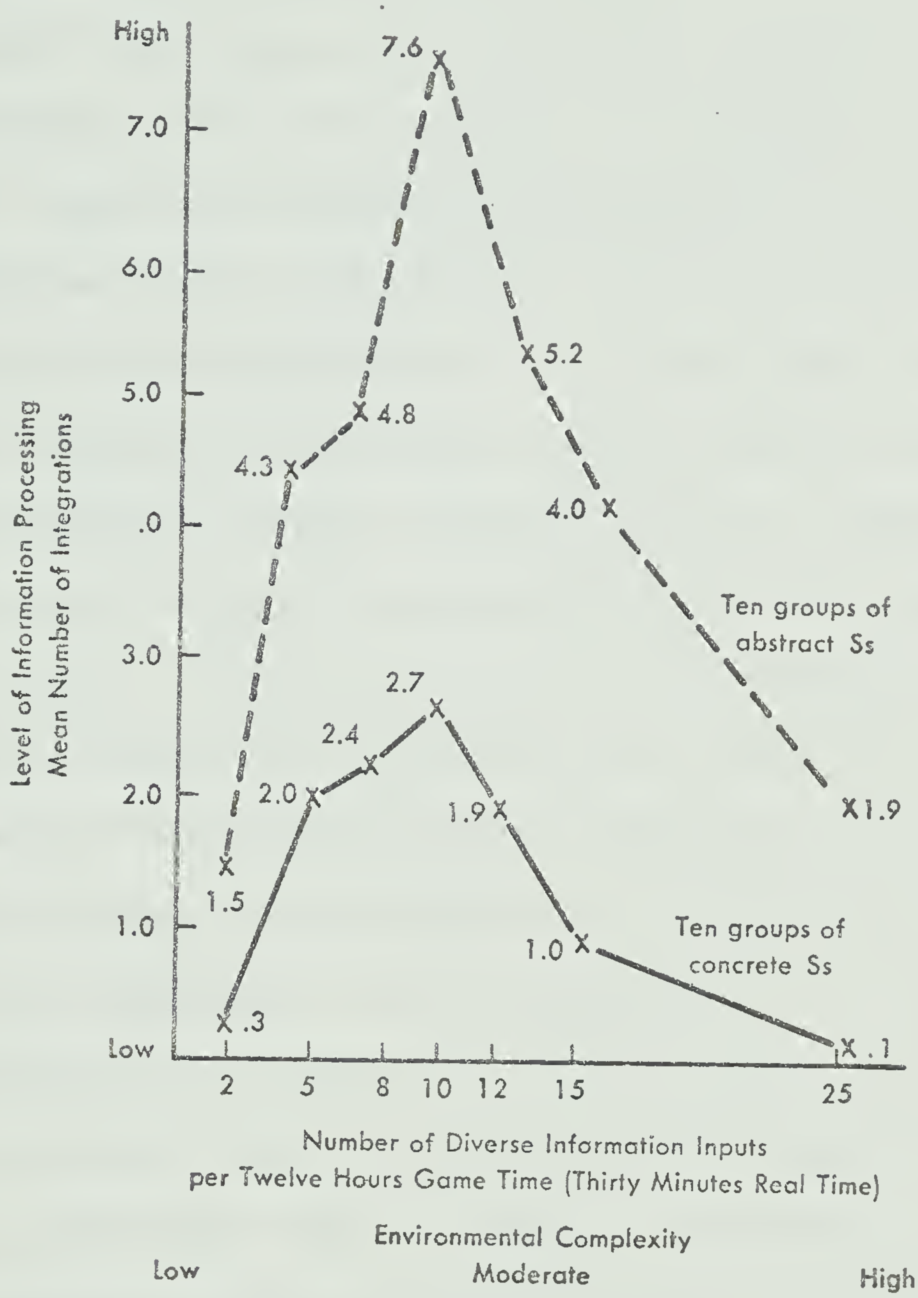

Figure 2. Performance Based on an Integration Criterion for Groups of Concrete and Abstract Subjects under Varying Conditions of Information Load (From Schroder et al., 1967, p. 151, Figure 10.1)

present study not only will the environment have been different for various administrators as a result of their training and experience, but also as a result of their readiness to transmit or receive information.

Zajonc (1954) has postulated that transmitting and receiving tuning lead to the arousal of different cognitive structures. Using the methodology described in Chapter Three, Zajonc conducted three experiments to test the following derivations from his postulates: (1) Given equal initial information, cognitive structures arising under transmitting tuning would manifest higher differentiation, complexity, organization, and unity, than structures arising under receiving tuning; (2) When information is received for future transmission it would be transformed into cognitive structures higher in each of the morphological properties than those of a cognitive structure transformed from information received as a basis for additional future information; (3) When individuals deal with information which is contrary to their knowledge or beliefs, cognitive structures formed from this information would show equal values on the morphological properties whether transmitting or receiving tuning was involved.

In order to test the first of the derivations, subjects were given equal initial information and then induced to tune in from the totality of this information a cognitive structure representing the given subject material; in this case a letter of job application. The letter was read by the

subjects with the prior instructions: "Skim over the letter and get a general idea of what sort of a person the writer is." After they had read the letter, the subjects were given instructions which prepared them for transmitting or receiving information.

In order to test the second of the derivations, the subjects were told how the information would be utilized. To the general statement employed in the first experiment was added the instruction, "After you have read this letter you will communicate to another group about the person who wrote it" or "After you have read this letter you will be given some additional information about the writer."

Results of the first two experiments supported the derivations from the postulates. Morphological properties were significantly higher under conditions of transmitting than receiving tuning. In addition, an analysis of attributes coded for specificity by two independent judges indicated that in the first experiment the transmitters' cognitive structures averaged 57.6% specific attributes, while those of the receivers averaged only 32.6%. This difference was significant at the .001 level. A similar difference was found in the second experiment. These results were assumed to derive from the fact that the receivers' cognitive structures were flexible, readily susceptible to change and had few specific attributes while the transmitters' cognitive structures were rigid, considerably resistant to change and had many specific attributes.

In the testing of the third derivation from Zajonc's postulates, incongruent information was introduced. The instructions to subjects read as follows: "After everyone of you has decided for herself whether or not to hire the applicant, everyone of you will be paired up with a member of the other group . . . someone who is decidedly different than you." The instructions for transmitters then read, "Your job in each case will be to tell your partner all you know about the applicant, so that she can see what reasons you had to decide as you did," and for receivers, "Your partner's job in each case will be to tell you all she knows about the applicant, so you can see her reasons why she decided as she did."

Results of the third experiment indicated that: (1) Receivers who used incongruent information had a pronounced and significant increase in Differentiation, Complexity, Unity, and Organization when compared to transmitters who used incongruent information; (2) Transmitters who employed contrary information, when compared to those who dealt with congruent information, demonstrated a significant decrease in Differentiation and Complexity and a significant increase in Organization, however, there was no significant difference on the Unity property; (3) When transmitters and receivers of incongruent information were compared, there were no significant differences beyond the .05 level.

Zajonc (1954) found that under conditions which involved the anticipation of dealing with incongruent

information, both receivers (70.7%) and transmitters (72.3%) showed a marked increase in the proportion of specific attributes, with the increase being somewhat larger for the receivers. The difference in the proportion of specific attributes between transmitting and receiving groups did not reach a significant level ($p < .05$).

The first two of Zajonc's experiments assumed and then demonstrated that transmitters manifest primarily rigid cognitive sets, whereas the receivers tune in flexible cognitive sets. This "flexibility-rigidity" dimension was defined by Zajonc (1954) in terms of resistance to change: "R-tuning corresponds to the anticipation of cognitive change in one's own cognitive set, whereas T-tuning corresponds to the anticipation of inducing changes in the cognitive set of another person (pp. 101-2)." In these terms, transmitters in the first two experiments were shown to possess a high resistance to change and receivers a high susceptability to change. Cohen (1965), employing Zajonc's technique on 120 Yale undergraduates, confirmed this notion when he demonstrated that reception tuning is more facilitative of suspension and the entertainment of contradictory cognitions in a person's impressions than is transmitting tuning.

Experiment three, by varying the resistance to change for both groups and by finding that the structure of the emerging cognitive sets varied correspondingly, provided addition empirical evidence to support the change explanation of the differences between transmitters and receivers. Zajonc (1954 and 1960) discusses the results observed in his

third experiment in terms of both selective effects and increases in specificity.

> It appeared in the examination of the data that those who decided to hire the applicant selected only positive characteristics and facts which supported their decision, and that they rejected those which acted against it. On the other hand, those who decided not to hire him selected only negative items.
>
> . . . Thus because of the incomplete utilization of information, only certain portions of it were transformed into cognition, thus decreasing the level of differentiation.
>
> This is especially true of transmitters. . . It should be noted, however, that the Rc-group [receivers of incongruent information] manifests dif[ferentiation] slightly higher than that of the R-group [receivers of congruent information]. The conjecture can, therefore, be made that where the increase in specificity is low, the effects of selectivity on decrease of dif[ferentiation] are more pronounced than where the increase in specificity is high (1954, p. 152).

> The decrement in complexity on the part of the transmitters is due to the selective effects of commitment to a position. Since they abandon those aspects that may weaken their position, their cognitive structures lose in elaboration. . . .
>
> . . . receivers protect themselves from unwanted changes by increasing unity, while transmitters because of their already high unity need not increase it.
>
> . . . The commitment to a position, therefore, because it leads to the selection of a particular type of material --selection that is quite systematic--provides a strong core around which the components of the cognitive structure may become readily organized (1960, p. 166).

Zajonc's Schemata and Cognitive Complexity under Transmitting and Receiving Conditions

At this point, it is important to re-examine the relationships between Zajonc's (1954) conceptualization of cognitive structures and the cognitive complexity variable as they apply under the environmental factors of T- and R-tuning. These relationships are speculative at this time.

Nevertheless, a stance regarding the direction of relationships provides a basis on which hypotheses using the cognitive complexity literature can be developed.

A certain amount of reiteration and expansion upon the concepts of cognitive structures and cognitive complexity as they relate to a subject's dealings with information is required before the necessary relationships can be posited. The concept of cognitive structures will be the first to be discussed. Zajonc (1954) assumed that a cognitive set regarding a given object or event becomes active when the individual anticipates dealing with some information about that object or event. He then maintained that there are two basic modes of dealing with information: receiving and transmitting. When an individual anticipates receiving information, he "tunes in" a set into which he will be able to admit this incoming information. When anticipating transmission of information, he "tunes in" a set on the basis of which he will be able to emit information.

R-tuning was thought by Zajonc to correspond to the anticipation of cognitive change in one's own cognitive set, whereas T-tuning corresponds to the anticipation of inducing changes in the cognitive set of another person. Cognitive subsets of a receiving cognitive set were thought by Zajonc to act as categories into which units of incoming information are selectively admitted, whereas cognitive subsets of a transmitting cognitive set act as potential units of the information to be emitted. Cognitive subsets whose function

is to admit all possible types of information were thought to require a sufficiently broad and general nature so as to facilitate the ordering of all possible information. Alternatively, cognitive subsets which are to serve as potential units of transmittable information require specificity. They cannot be general in their identity, maintains Zajonc, because information is not adequately transmitted if it consists of general units alone. These general units serve as structural bases on which the specific units of information are organized.

Zajonc (1954) summarizes his argument in the following manner:

> . . . it can be derived that R-tuning leads to the emergence of <u>flexible</u> cognitive sets, whose subsets are likely to be characterized by <u>generality</u> of content, whereas T-tuning leads to the emergence of rigid cognitive sets, which include both <u>general and specific</u> subsets (p. 103).

Finally, Zajonc maintains that these differences along the flexibility-rigidity and the specificity-generality dimensions are reflected in differential values on the descriptive morphological properties, such as the degree of differentiation, complexity, unity, and organization.

Turning to the second area, cognitive complexity, a number of studies have compared the behavior of cognitively complex and cognitively simple subjects when processing information. Because the more cognitively complex person has available more dimensions with which to construe the stimulus person(s) the assumption that he should be more "accurate" in his perceptions of others seems reasonable. Both Bieri (1955) and

[illegible]

Leventhal (1957) found that this hypothesis held, but only in the sense that more complex judges tended to perceive differences (as opposed to similarities) between self and others more accurately.

These perceived differences appear to be more closely related to general than specific attributes. Leventhal and Singer (1964) found, for example, that in an impression formation task, more complex subjects sought information related to inner states while less complex subjects responded more to surface qualities. Sieber and Lanzetta (1964) also noted a tendency for more "abstract" subjects to entertain more conflicting hypotheses in a problem-solving task.

In addition, Sieber and Lanzetta (1964) found that cognitively complex persons take more time than cognitively simple persons before reaching a decision. This last finding suggests that the higher one's cognitive complexity the more one is likely to suspend judgement. This suspension of judgement would be even more likely to occur if a person knew that more information about the stimulus was to be provided, for example, under R- as opposed to T-tuning.

In a study couched mainly in terms of primacy and recency effects and employing contradictory information, Mayo and Crockett (1964) found that the less complex subjects formed more univalent impressions of a stimulus by changing their initial judgement toward the most recent but contradictory information. The more complex subjects retained both types of information in their impressions, producing ambivalent

judgements of the stimulus (that is, they changed their impressions less).

Research by Tripodi and Bieri (1964 and 1966) and Leventhal and Singer (1964) which analyses the confidence of judgements made by more and less cognitively complex judges with consistent and inconsistent information, appears to complement both Sieber and Lanzetta's and Mayo and Crockett's findings. In general, this former research has found that the more complex judges are more certain than the less complex judges with inconsistent information but less certain with consistent information.

In summary, the evidence with regard to the information processing of cognitively simple as compared with cognitively complex individuals indicates that the cognitively simple (1) stress similarities rather than differences between themselves and the stimulus, (2) employ specific surface qualities rather than more general qualities, (3) are quick to make decisions rather than suspending judgement, and (4) are more certain of their judgements when consistent information is involved. On this last point, it may be argued that because the less cognitively complex persons tend to form univalent impressions using the most recent information they also perceive the majority of information as consistent.

How will these information processing qualities of cognitively simple and complex individuals be reflected in receiving and transmitting tuning? Under R-tuning, the greater specificity of cognitively simple persons and a

tendency for cognitively complex persons to suspend judgement while awaiting the presentation of additional information, suggests that the cognitively simple subjects will score higher than the cognitively complex subjects on Zajonc's morphological properties. Under T-tuning, different conditions prevail; (1) no additional information can be expected, (2) decisions <u>have</u> to be made and, (3) both general and specific attributes are required for high scores on the morphological properties. Because the cognitively complex as compared with the cognitively simple individual can be expected to have more attributes (having both general and specific attributes) and because he can be expected to give greater structure to these attributes (having more general attributes with which to organize specific attributes), the cognitively complex individual will score higher than the cognitively simple individual on Zajonc's morphological properties. Two experiments involving the transmission of information (Zajonc and Wolfe, 1963; Harvey, 1966) support this last position; in both cases the more cognitively complex subjects manifested more attributes of a stimulus and integrated them to a greater degree than the less cognitively complex subjects.

Education and Cognitive Complexity

Several authors have given the concept of cognitive complexity a central place in their thinking about education.

Hunt (1966) maintains that the chief goal of education is to modify the cognitive structure of pupils. He asserts that "the aim of education is to produce persons who are questioning, inventive, original, critical, creative, and if need be, different (p. 289)." Joyce and Harootunian (1967) outline a theory of teaching behavior for which the concept of cognitive complexity and associated concepts such as flexibility, creativity, and open-mindedness are central.

Anderson (1968) has indicated the necessity of investigating and using the complexity construct in his elucidation of the educational implications of Galbraith's (1967) book, the New Industrial State. He points out that a particular type of education can be a bulwark against domination by the technostructure as described by Galbraith. Thus, he believes that the goal of education must be to develop individuality, pluralism, autonomy, and flexibility (that is, more complex cognitive structures), rather than the compliant, conforming, and cognitively simple person that the technostructure seeks to produce by way of advertising and the mass media.

Recent research has also shown that the complexity of cognitive structures, the "filters" through which individuals view the world, are significantly related to teacher and student behavior. Empirical evidence indicates that the level of cognitive complexity is a critical variable affecting teacher performance. A study by Joyce, Lamb and Sibol (1966), which examined the way teachers high and low in complexity

processed information about students, found that the "abstract" (more cognitively complex) subjects became more certain as they received more information. "Concrete" subjects tended to be certain from the start. The "concrete" teacher could not effectively utilize information about students while the "abstract" teacher integrated and used additional input to benefit the student.[5]

Research by Harvey, White, Prather, Alter, and Hoffmeister (1966) has also related the degree of cognitive complexity to desirable aspects of teacher and student behavior. "Abstract" teachers were found more resourceful, less dictatorial, and less punitive than "concrete" teachers. A further study by Harvey and his associates (1968) found that students of "abstract" teachers were more involved, more active, higher in achievement, and more "abstract" than were students of "concrete" teachers. Hunt and Joyce (1967) report a positive relationship between the abstractness of a teacher trainee's conceptual system and an initially reflective and adaptive teaching style. A recent study by Murphy (1970) reports a similar finding, that is, a statistically significant correlation between the occurence of a reflective teaching style and the teachers' conceptual system. A reflective teaching style was defined as one in which more

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[5]Dailey (1952), in his study of the effects of premature conclusion upon the acquisition of understanding of a person, found that not only are first impressions lasting but they also tend to be inaccurate. Subjects who had not formed first impressions were found to be more accurate in predicting actual responses of others than were those who had allowed first impressions to color their final judgements.

than ten per cent of teaching time was spent "helping students to theorize" and/or "helping students toward self-expression."

Murphy (1970) concludes her research by mentioning one of many possible implications should cognitive structure be shown a successful predictor of "good" teaching: the need to question existing teacher training techniques.

> Among educators are those who believe that the goal of education is to produce persons who are inventive, original, critical and adaptive in directing and meeting change. If such a goal is accepted, if certain teaching styles are more conducive to conceptual growth and development toward such qualities, and if conceptual system [Cognitive Structure] is useful in predicting the teaching styles of teachers (as it appears to be), then certain questions concerning the professional preparation of teachers needs to be asked (p. 14).

There is also some indication that the cognitive complexity construct may offer a new way of grouping pupils. Studies by Hunt (1966) and Hunt and Hardt (1967) indicate that teachers could be matched with classrooms on the basis of their conceptual level. In the latter study, for example, Hunt and Hardt showed that students who were lowest in complexity performed best in a "concrete" structured classroom situation, whereas students highest in complexity learned best in a more flexible situation. Research mentioned in Chapter One, centering around the concept of "categoric similarity," suggests that grouping by similar cognitive structures would result in the most effective classroom communication.

The implications of the above theory and research are important for the present study. There is evidence that teachers' cognitive structures influence the content and conduct of the activities they engage in with their students.

However, the implications go beyond teachers when we conceptualize as "training agents" (Hunt, 1966) all those who, through significant roles, affect the personality development of others. Under the label of "training agent" one could place school administrators--not only in their relationship with students, but also in their relationship with teachers. Could a school principal and his assistant teachers be "matched" on cognitive complexity?

In their recent work examining teacher appraisal, Sorenson and Gross (1968) suggest just such a matching process between teacher evaluators (administrators) and teachers. They argue that because a teacher may be said to be "good" only when he satisfies someone's expectations, and because people differ in what they expect from teachers, a scheme for evaluating teacher effectiveness must take those differences into account. The previously mentioned research by Prince (1957), Guetzkow (and Shartle) (1951), Bidwell (1955), Chase (1953), and Meyer (1955) which indicates that congruence of values between principals and teachers is directly related to the teacher's confidence in leadership and to the teacher's ratings of the principal's effectiveness, offers further support for the desirability of matching teachers and administrator. One of the characteristics that may be employed in such a matching process is that of cognitive complexity.

II. HYPOTHESES DEVELOPMENT

Introduction

Before proceeding with the development of hypotheses, it will be beneficial to restate and expand the problem from Chapter One in terms of the groups employed in the study. The problem is to investigate the relationships existing between administrative training, experience and personality variables, and the educational administrator's characteristics as a transmitter and receiver of information. Educational administrators, however, have traditionally been selected from amongst the ranks of teachers. Thus it was desirable to examine teachers for the same communication/perception characteristics as administrators.

Similarly, it was desirable to examine a senior administrator group (superintendents) to determine whether the level of position within the administrative hierarchy was related to transmitting and/or receiving characteristics. Tests were also carried out among graduate students in both a master's and doctoral programme in educational administration. Comparisons between these two graduate student groups indicated whether the university program significantly affected the communication/perception characteristics of those taking it. The direction of this change, toward or away from the characteristics typical of the other groups, was also indicated. Finally, it was desirable to examine an education undergraduate student group's (control group) transmitting and/or receiving characteristics in order to attempt a

replication of Zajonc's original research. The data collected concerning the age, sex, experience, personality, and so on, of the various group members were employed as additional independent variables in the study.

The work of many authors was employed earlier to indicate that a person's information processing and cognitive structure depends in part on organization acquired through experience. Zajonc's theory and research was used to show that the immediate environment of transmittion or reception of information affects to a large degree a subject's cognitive structure values. In order to relate these findings on cognitive structure to the present study, another more specific question needs to be posed: Are there differences in communicative behavior, perceptions or cognitive structures among those in various positions in education? Or, to restate the question: Are there any indications that undergraduates in education, graduate students in educational administration, teachers, principals, and superintendents differ from one another (or themselves) in the way they communicate or perceive, as indicated in the cognitive structures they display when preparing to transmit or receive information?

Hypothesis 1.0

> Following the induction of cognitive tuning, the control[6] T- and R-groups will demonstrate differences

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[6] "Control" in the sense that they are the groups most directly comparable to Zajonc's original groups and in the sense that they will not have teaching experience, administrative experience, or have taken the Educational Administration graduate programme.

with respect to each of the four morphological properties of cognitive structures comparable to those of the groups used in Zajonc's original sample.

Zajonc's (1954) research has indicated that the four morphological properties of cognitive structures, Differentiation, Complexity, Unity, and Organization, are significantly higher under conditions of T-tuning than R-tuning. Cohen's (1965) study produced similar results. In other words, there is evidence to suggest that the control group will behave in the same manner as Zajonc's original sample under conditions of T- and R-tuning.[7]

Hypothesis 2.1

Following the induction of cognitive tuning, the teacher T-group will score significantly higher than the control T-group with respect to each of the four morphological properties of cognitive structures.

Hypothesis 2.2

Following the induction of cognitive tuning, the teacher R-group will score significantly lower than the control R-group with respect to each of the four morphological properties of cognitive structures.

Evidence of differences between education students and teachers in the field is scarce. The small amount of research which is available suggests few differences actually exist. For example, Von Fange (1961), after extensive comparisons among different "types" of educators, stated: "The study failed to show convincingly that teachers in service

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[7] The pilot study carried out prior to the present study with a number of undergraduate student groups indicated support for these differences. However, the pilot study suggested that there would be no significant difference between T- and R-tuning scores on the Unity property (Appendix A).

differed significantly from students in education (p. 178)."

On the other hand, results of the studies by Flanders (1960) and the research based on the Omnibus Personality Inventory (OPI) suggest that teachers would score higher in cognitive structure under conditions of T-tuning and lower under conditions of R-tuning than education students. The studies carried out by Flanders (1960) suggest that teachers tend toward an emphasis on transmission rather than reception in their classroom communication. This emphasis suggests that teachers gain more experience and adeptness in transmitting information than students. On the other hand, students might be considered to gain more experience and skill in the reception of information.

A study by Ratsoy (1965) employed the Omnibus Personality Inventory (OPI) to perform a cross-sectional examination of the attitudes of prospective teachers. Unfortunately only four of the thirteen scales from the OPI were used. However, the Thinking Introversion Scale (TI) was employed and thus a link to the cognitive structure variable and the present study is possible.

A description of the Theoretical Orientation Scale (TO), the Complexity Scale (Co) and, especially, the TI Scale from the OPI, suggests that they all involve a measure of cognitive structure. Persons scoring high on the measure of TI are characterized by "a liking for reflective thought, particularly of an abstract nature (OPI Research Manual, 1962, p. 75)." High scorers on the TO Scale "are generally logical,

rational, and critical in their approach to problems (OPI Research Manual, 1962, p. 75)," and high scorers on the Co Scale are "tolerant of ambiguities and uncertainties, are fond of novel situations and ideas, and are frequently aware of subtle variations in the environment (OPI, Research Manual, 1962, p. 75)."

Further, the research by Scott and his associates (1970) links the various scales from the OPI to a number of measures of cognitive complexity, including Harvey's "Concrete-Abstract" dimensions. The TI Scale was found by Scott to distinguish significantly ($p < .01$) between those scoring high in concreteness and those scoring high in abstractness. The TO and Co Scales also distinguished between concrete and abstract thinking subjects, but only the Co Scale reached significance ($p < .05$).

Among the significant differences found by Ratsoy (1965) with the TI Scale were: (1) married prospective teachers scored significantly higher ($p < .001$) than single prospective teachers (p. 121); (2) a tendency for TI to increase with age (p. 122); (3) education undergraduates with teaching experience scored significantly higher ($p < .001$) than those with no teaching experience (p. 141); (4) those undergraduates having aspirations to supervisory or administrative positions scored significantly lower ($p < .001$) than those aspiring to classroom teaching (pp. 150-1); (5) TI increases in years one to four at university, but this increase is mainly accounted for by males (p. 164).

Weseen (1970) performed a longitudinal study on 105 students from Ratsoy's (1965) original sample. He confirmed the finding that the group increased significantly ($p < .01$) in TI. Another study by Stewart (1964), which examined 289 students in a four year university liberal-arts program, found that females alone increased in TI. Finally, a study by Heist (1969) reported that creativity in college students was found to be identifiable by a set of above-average scores on seven OPI scales, including the Thinking Introversion Scale.

The link between the TI Scale and cognitive complexity suggests that the differences mentioned above with respect to prospective teachers and thinking introversion would also apply to cognitive structure scores. Married as compared to single subjects, older as contrasted to younger subjects, subjects with teaching experience as compared to those with no such experience, subjects with aspirations to classroom teaching as compared to those with aspirations to administrative positions, and increased number of years of university training would all result in high cognitive complexity.

In addition, it is suggested that teachers in service are more likely to be married, older, have more university training, and have more teaching experience than undergraduate education students. Therefore, teachers in service can be expected to also possess higher cognitive complexity than undergraduate education students and thus higher cognitive structure scores under T-tuning and lower cognitive structure scores under R-tuning.

<u>Hypothesis 3.1</u>

Following the induction of cognitive tuning, the part of the teacher T-group above the median number of years

of experience will score significantly higher with respect to each of the four morphological properties of cognitive structures than that part of the T-group below the median number of years of experience.

Hypothesis 3.2

Following the induction of cognitive tuning, the part of the teacher R-group above the median number of years of experience will score significantly lower with respect to each of the four morphological properties of cognitive structures than that part of the R-group below the median number of years of experience.

Data specifically related to differences between teachers with varying amounts of experience is also scarce. However, two pieces of information suggest that the more experienced teacher is more cognitively complex than the less experienced teacher. He would thus tend to score higher on the cognitive properties under T-tuning but lower under R-tuning than the less cognitively complex teacher. First, the data presented above in support of Hypothesis two suggests that married, older, more experienced, and classroom-aspiring teachers are higher in cognitive complexity than single, younger, less experienced, and administration-aspiring teachers. If it is accepted that more experienced as compared to less experienced teachers are more likely to possess the former set of attributes, then it follows that they are also more cognitively complex.

The second piece of information is related to the "frequency of interaction hypothesis." Because one might expect more as compared with less experienced teachers to have been involved in more frequent and intimate interactions, even if this interaction is only a result of a longer time in schools, then they would also tend to be more cognitively complex.

Therefore, given these last two pieces of information, increased teaching experience, especially when combined with the age and upward mobility variables (Infra, pp. 76-8), will likely clarify any differences in cognitive structures between teacher groups.

<u>Hypothesis 4.1</u>

> Following the induction of cognitive tuning, the principal T-group will score significantly higher than the teacher T-group with respect to each of the four morphological properties of cognitive structures.

<u>Hypothesis 4.2</u>

> Following the induction of cognitive tuning, the principal R-group will score significantly lower than the teacher R-group with respect to each of the four morphological properties of cognitive structures.

<u>Hypothesis 5.1</u>

> Following the induction of cognitive tuning, the superintendent T-group will score significantly higher than the principal T-group with respect to each of the four morphological properties of cognitive structures.

<u>Hypothesis 5.2</u>

> Following the induction of cognitive tuning, the superintendent R-group will score significantly lower than the principal R-group with respect to each of the four morphological properties of cognitive structures.

If it is accepted, or can be demonstrated, that the higher positions within an organization are more environmentally complex than the lower positions, and it is given by research findings that experience in environmentally complex situations increases an individual's cognitive complexity scores, then the higher one ascends in the organization the higher one would expect <u>cognitive complexity</u>

scores to be. To complement this conditional effect, it may be that cognitively complex individuals seek out the more complex situations, that is, the higher organizational positions.

However, data on these conditional and dispositional factors as they relate to communications behavior does not indicate a simple pattern. On the one hand, evidence suggests that administrators as compared with other organizational members are more general, abstract, and flexible in their cognitive structures. On the other, evidence suggests that they are specific, concrete, and highly structured. Thus a "flexibility-rigidity" duality is indicated; a duality which among administrators appears to become more polarized as position in an organization increases. Consistent with the earlier interpretation of the relationship between Zajonc's (1954) morphological properties and the cognitive complexity variable, it is expected that this duality will be reflected in transmitting and receiving behavior in the form of higher organizational members possessing significantly larger T-tuning but significantly smaller R-tuning scores than lower organizational members.

To aid in interpretation, available data has been presented under four themes: (1) the "frequency of interaction hypothesis"; (2) organizational influences; (3) the extra-version emphasis of administrators; (4) additional personality differences between administrators and other organizational members. Each theme has been closely related

to cognitive complexity.

Crockett (1965) has postulated what has been called the "frequency of interaction hypothesis," that cognitive complexity varies with the degree to which an individual "interacts frequently and intimately" with environmental objects in a particular domain. Studies cited by Crockett in support of the hypothesis indicate that; (1) fraternity members have higher cognitive complexity scores than non-fraternity college members (Mayo, cited by Crockett, 1965); (2) extroversion significantly correlates with cognitive complexity (Bieri and Messerley, 1957); (3) more constructs are given when the person being judged is a peer, liked, and of the same sex as the subject, than when the person is older than the subject, disliked, and of a different sex (Supnick, cited by Crockett, 1965).

In all the studies cited by Crockett to support his "frequency of interaction hypothesis," certain frequencies of interaction were assumed. It was assumed, for example, that fraternity members interact more frequently and intensively with other persons than independents. Wicker (1969), on the other hand, has examined the rate of interaction and its effect on cognitive structure more <u>directly</u>. Subjects were forty juniors from a large high school and forty matched juniors from small high schools. A modified Rep Test was employed as the cognitive complexity measure. It was found that small school juniors, who entered a wider range of school behavior settings ($p < .001$), and had more positions

of responsibility in the settings ($p < .001$) than large school juniors, also had higher cognitive complexity scores ($p < .001$). Across the two groups of subjects, cognitive complexity and range of settings engaged in correlated .26 ($p < .05$) and cognitive complexity and number of positions of responsibility correlated .35 ($p < .01$). Wicker's results are consistent with the "rate of interaction hypothesis"; the more kinds of behavior settings a subject enters, and the more performances he has, the higher his cognitive complexity score.

Which group of subjects in the present study could be expected to have experienced and performed in the most kinds of behavior settings? Organizational factors are important here. For example, Long (1962) suggests that communication complexity increases for subjects as level in the hierarchy of an organization increases:

> The higher the level an organization member attains the more complex the act of communications in which he becomes involved and the more difficult the balancing of interests, programs, and loyalties. Functioning at one's own level . . . involves constantly higher abstraction and greater and greater difficulties of communication (p. 148).

There is evidence to support Long's (1962) suggestion. In a study of the communication of forty-two members of an industrial company, ranging in position from eight vice-presidents to eighteen clerks and production workers, Zajonc and Wolfe (1963) found that:

> . . . staff employees have wider formal communication contacts than line employees; within each function high hierarchical levels have wider formal communications contacts than low hierarchical levels (p. 21).

Katz and Kahn (1967) make a similar suggestion:

> The closer one gets to the organizational center of control and decision-making the more pronounced is the emphasis on information exchange (p. 223).

In fact, Katz and Kahn (1967) maintain that the executive in a complex organization must utilize more than one system of information "so that he will not become a captive of one sector of his own organization (p 278)."

Other reasons may be advanced for the increased environmental complexity as one climbs an organizational hierarchy. Nath (1968) maintains that as one progresses in the organizational hierarchy one deals more and more with people as opposed to problems basically of a technical nature. Katz and Kahn (1967) suggest that the lower participants tend to deal with <u>problems</u> rather than <u>dilemmas</u> in decision-making. In Rapoport's (1960) terms, a problem is a difficulty which can be solved in the frame of reference suggested by its nature, by past precedents for dealing with it, or by the application of existing policy. A dilemma, on the other hand, is not soluble within the assumptions explicitly or implicitly contained in its presentation. Katz and Kahn (1967) elaborate:

> The facts of organizational life often preclude the recognition of dilemmas . . . . The decision-maker at lower levels in the organization often lacks the power to reformulate the problem. It comes to him with the givens of previous policy decisions he must accept (p. 277).

Katz and Kahn (1967) also maintain that the organizational context is by definition a set of restrictions "for focusing attention upon certain areas and for narrowing the cognitive style to certain types of procedures (p. 277)."

They expand in terms of leadership:

> There is a relationship between the three patterns of leadership we have described and the hierarchical levels of positions in the organization . . . only the top echelons of line and staff officers are really in a position to introduce changes in structure. The piecing out of structure is found most often in the intermediate levels of the organization. And the lowest supervisory level has open to it mainly the exercise of leadership by the skillful use of existing structure.
>
> The exercise of these three patterns of organizational leadership also calls for different cognitive styles, different degrees and types of knowledge, and different affective characteristics (p. 311).

According to Katz and Kahn (1967, p. 312), the cognitive skill required in the top echelons of an organization, where the type of leadership process involves origination, is a system perspective. At the lower levels, where the type of leadership process involves administration, technical knowledge and an understanding of the system of rules are suggested as the required cognitive skills.

From the above, then, one can suggest that the higher the organizational level the greater the amount of communication, interaction, and complexity of environment and, therefore, the more complex an individual's cognitive structure. In the present study, this suggestion should result in higher T-tuning but lower R-tuning scores for superintendents when compared with principals, or for principals when compared with teachers. Zajonc and Wolfe (1963) provide research to support this contention under transmission conditions. They employed Zajonc's (1954) techniques on various levels in the hierarchy of an industrial firm. Those employees who reported many as compared with few contacts in

their <u>formal</u> communications tended to be more differentiated, more complex, and more organized in their cognitive structures (a similar comparison using reported informal communications did not produce this effect). Differences in cognitive structure for formal communications were also found closely related to differences in level of hierarchy (see Table 1). As a subject's position in the hierarchy increased do did his cognitive structure scores.

TABLE 1

Properties of Cognitive Structures of Three Hierarchical Levels of Employees*

Property	Heads	Supervisors	Workers
Differentiation	22.8	12.8	9.1
Complexity	56.9	32.8	23.3
Organization	133.06	36.14	17.72

*From Zajonc and Wolfe (1963, p. 16, Table 4). The higher the index the more differentiation, complexity, or organization.

A weakness of Zajonc and Wolf's (1963) research, however, lies in the subject chosen from which to measure cognitive structures, that is, the organization to which subjects belonged. With this topic it is highly unlikely that subjects would have had equal initial information. In addition, Zajonc and Wolfe's experiment only concerned itself

with transmission tuning.

The literature suggests some additional points of interest with regard to differences in cognitive structures between and among teachers, principals, and superintendents. Newcomb (1965, p. 333) theorized and Lieberman (1956) demonstrated that a change in roles is accompanied by a significant change in attitude and the way in which the roles of self and others are perceived. This indicates the probability that the longer a principal has held a position, the <u>less</u> like teachers he becomes in terms of attitudes and perceptions. On the other hand, however, the research by Newcomb (1963, pp. 302-3) and Festinger (1957, pp. 1-31) made a case for the position that frequent communicators tend to become more alike. Cantril (1957) has propounded the belief that those group members who have similar experiences will probably have similar perceptions as a consequence. Scharf (1967), however, found that the rate of emergent interaction amongst teachers did <u>not</u> affect their professional role orientation.

All this means that unless the influence of status differential, role identification (Kolman, 1961; Shibutani, 1955), and different work experiences is stronger than that of common work experiences and communication frequency, principal groups will not necessarily be different from teacher groups in the cognitive structures induced by cognitive tuning. At the same time, the group of more senior administrators who have less frequency of contact with teachers than do principals, probably will be less similar to teachers in

cognitive structures than will the principal groups.

Several studies suggest that educational administrators possess an extroversion orientation. Bieri (1971) maintains that recent studies indicate "extroversion, as indexed by the scale developed by Eysenck, may be characteristic of the more cognitively simple individual (p. 200)." Bieri (1971) argues that these latter results, "while in need of further substantiation, indicate that cognitive complexity does not develop as a function of sheer <u>amount</u> of contact with others. . . (p. 200)."

If it can be shown that administrators <u>are</u> extroverted, then it can also be assumed that they tend to be cognitively simple. White (1965) has noted this extroversion orientation among educational administrators:

> In general, the educational researcher appears to be a self-sufficient introvert. An individual with these same characteristics would perhaps find administration unappealing or even unpleasant.
>
> A high degree of interest in people and in dealing with people, a relatively high intellectual ability, a concern for social norms, a high regard for exactness, a tendency to be concerned with practical, immediate needs rather than with theoretical concerns, and a tendency toward conservatism along with a sensitivity to traditional ideas as opposed to radical "free thinking" would all appear, as this study suggests, to be closely related to satisfactorily fulfilling the administrative role. In general, the educational administrator appears to be a practically oriented extrovert. It may be that persons with these personality characteristics would find research unchallenging and boring.
>
> The results obtained in this study conjunct quite closely with the results obtained by R. B. Gattell and J. E. Drevdahl (1955) using researchers and administrators in physics, biology, and psychology (p. 299).

Both Von Fange (1961) and Plaxton (1965) found that male educational administrators tended to possess the

extraversion, an orientation toward the external world of people and objects, and judgement, related to organizing, planning, and decision-making, dimensions of personality as measured by the Myers-Briggs Type Indicator (MBTI).

> A total of 55.2 percent of the principals and 44.7 percent of the superintendents . . . possessed these two personality dimensions in common. This combination is found among 37.5 percent of the general male population (p. 119).
>
> When each of the two dimensions was taken separately . . . 58.5 percent of principals and 59.1 percent of the superintendents were extroverted, as compared with 75 percent of the general male population. A total of 92.3 percent of the principals and 81.1 percent of the superintendents possessed the judgement dimension, while this dimension occurs among 50 percent of the general population (p. 119).

Thus studies employing the MBTI indicate that administrators tend to have both an extroversion and a judgement orientation. Apart from Bieri's (1971) findings that extroversion may be a characteristic of the more cognitively simple individual, research with and linking the Omnibus Personality Inventory (OPI), MBTI, and cognitive complexity measures suggests that both an extroversion and a judgement orientation are positively related to cognitive simplicity.

Research employed in the validation of the OPI (1962, pp. 46-7) indicates that: (1) the Thinking Introversion Scale (TI) of this instrument correlates ($r = .54$) significantly ($p < .05$) with the Introversion (I) scores on the MBTI; (2) the Theoretical Orientation Scale (TO) correlates ($r = .64$) significantly ($p < .05$), with the Introversion Scale; and (3) the Complexity Scale correlates ($r = .34$) significantly ($p < .05$) with the Myers-Briggs Perception (P) scores. In the MBTI the I measure is opposite to Extroversion and the

P measure is opposite to Judgement.

It has already been shown that there are descriptive and empirical links between the OPI Scales and cognitive complexity measures. Congruent with Sieber and Lanzetta's (1964) and Stager's (1967) results, Bower (1969) has also shown that cognitively complex in comparison to cognitively simple individuals prefer perceiving to judging (J-P Scale of the MBTI). Thus, relationships among MBTI Scales, OPI Scales, and measures of cognitive complexity and results found by White (1965), Von Fange (1961), and Plaxton (1965) with educational administrators, suggest that superintendents and principals tend toward the concrete (cognitively simple) end of a concrete-abstract continuum. Harvey et al. (1968, p. 155) suggest that this tendency toward concreteness also applies to a great number of teachers. They classified fifty of sixty-seven elementary teachers in one of their studies as belonging to System One (very concrete) while only eight were "weak instances" of System Four (highly abstract).

Von Fange (1961) made a number of other comparisons among different "types" of educators but found few significant results. On the difference between administrators and teachers, Von Fange concluded: "Educational administrators, when compared with teachers in service, did not differ significantly, but it was shown that not all teacher preference-types were characteristic of administrators (p. 178)." On the other hand, Hodgkinson's (1970) study tends to support the hypothesis that value orientations change with changes of

rank in an organizational hierarchy. Principals and teachers from a random sample of forty public elementary schools in the Greater Vancouver metropolitan area completed the value scale developed by Scott (1956). When administrators (principals and vice-principals) were compared against teachers, significant differences at the .01 level were found on the values of Creativity, Independence, and Physical Development; and at the .05 level on the value of Kindness. All of these values were held more strongly by teachers. Creativity and independence[8] have already been shown to be positively related to cognitive complexity. Thus, combining these results, it can be suggested that teachers are more cognitively complex than administrators.

There is also evidence that links personal characteristics to status position and motivation. Bodden's (1970) research has indicated a moderate but significant relationship between cognitive complexity, as measured by Bieri's Rep Test and a similar instrument, and the choosing of an occupation in which the environment is compatible with a subject's personality-coping style, as determined by a high point code on Holland's (1966) Vocational Preference Inventory. This finding by Bodden suggests that the complex subject, since he is able to make more and finer discriminations among

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[8]If it can be argued that dependence (as opposed to independence) is similar in nature to extroversion and both are similar to a tendency to respond in more socially desirable ways, then a further link to the cognitive complexity variable can be established. Using the Marlowe-Crowne Scale, Bieri (1965) has reported that more socially desirable responding is associated with lower cognitive complexity.

occupations, is better able to identify occupational environments suited to his personality-coping style than is a less complex subject.

A five year follow-up study currently under way at the University of Alberta employing part of Ratsoy's (1967) original sample of education undergraduates provides some further empirical support for this last contention. In general, it was found that the higher a subject's cognitive complexity (as measured by the TI Scale of the OPI) in the final year of university the higher was his present position within an educational organization. TI Scale means for subjects tested in 1967 by the positions they held in 1971 were as follows: Teachers (N = 119), 55.1; Principals (N = 11), 53.7; Department Heads (N = 10), 56.3; Coordinators (N = 27), 59.1; Central Office Personnel and Consultants (N = 15), 64.9 (Naylor, 1971, personal communication).

Dill (1962, p. 105) found that men looking for supervisory careers chose ones that tended to coincide with their own need states in terms of the degree of autonomy or dependence. Thieman (1970) has noted a need for autonomy among superintendents.

> While money seems to be the driving force of principals, vice-principals, and central office personnel, it is less important to those who hold superintendencies. At some point, apparently, the amount of money earned is sufficient to meet the individual's needs, of which point he is able to direct his attention to other things. Superintendents state as their major reasons for entering administration the desire to be an educational leader and

> the freedom to develop their own ideas. In short, as an administrator he wants to be his own man and to call the shots the way he sees them (p. 8).

Carlson (1965) had reported a similar phenomena in his studies of superintendents.

In terms of Maslow's (1954) hierarchy of needs, it could be suggested that by the time an educator has attained the role of superintendent the physiological, security, social, and esteem needs are satisfied and attention is turned to satisfaction of the autonomy and self-actualization needs. With a sample of nearly 2,000 managers, Porter (1962) used a modified Maslow-type categorization of needs to investigate perceived deficiences in fulfillment. The vertical location of management positions was found by Porter to be an important factor which managers felt that they could satisfy particular psychological needs, especially the three higher order needs. In other words, satisfaction of the esteem, autonomy, and self-actualization needs increased at each higher level of management.

Research on the correlates of cognitive complexity indicates that cognitively complex persons place less dependence on precedence and authority, have lower needs for structure or affiliation, and have higher needs for self-sufficiency, flexibility, and perceptual and cognitive independence (Bruner and Tajfel, 1961; Harvey, 1966, 1967; Phillip, 1968). Put another way, cognitively complex individuals tend to be more autonomous than those who are cognitively simple. Combined with the results of research

on autonomy at various levels in an organizational hierarchy, results of this latter research imply that the higher one's position in an organizational hierarchy the higher one's cognitive complexity. In the school organization, cognitive complexity and its attendant specificity and generality under T-tuning and flexibility under R-tuning would be expected to increase from teacher to principal and then to superintendent.

In summary, three of the areas discussed above indicate that cognitive complexity increases from teachers to principals and then to superintendents. These areas were: (1) the "frequency of interaction hypothesis" combined with data indicating that environmental complexity increases as level in an organizational hierarchy increases; (2) the fact that more cognitively complex persons seek complex situations, that is, higher organizational positions; and, (3) the autonomy need of those in the higher organizational positions and the positive relationship between autonomy and cognitive complexity. On the other hand, three areas were discussed which indicate the opposite trend; cognitive complexity increases from superintendent to principal to teacher. These last three areas were: (1) the lower creativity of administrators as compared to teachers; (2) the tendency for administrators to possess an extroversion or dependent orientation; and, (3) the tendency for administrators to have a judgement or structuring orientation. Low creativity, extroversion, dependency, and a judgement orientation were all shown to be negatively related to cognitive complexity.

Unfortunately, there is no evidence available in the

six areas mentioned above from which decisions about the extent of T- or R-tuning can be made. However, as indicated in the introduction to this section, it is expected that the apparent duality in the literature will be reflected in transmitting and receiving behavior in the form of higher organizational members possessing significantly higher T-tuning but significantly lower R-tuning values than lower organizational members.

Hypothesis 6.1

> Following the induction of cognitive tuning, the part of the principal T-group above the median number of years of experience will score significantly higher with respect to each of the four morphological properties of cognitive structures than that part of the T-group below the median number of years experience.

Hypothesis 6.2

> Following the induction of cognitive tuning, the part of the principal R-group above the median number of years of experience will score significantly lower with respect to each of the four morphological properties of cognitive structures than that part of the R-group below the median number of years experience.

Hypothesis 7.1

> Following the induction of cognitive tuning, the part of the superintendent T-group above the median number of years of experience will score significantly higher with respect to each of the four morphlogical properties of cognitive structures than that part of the T-group below the median number of years experience.

Hypothesis 7.2

> Following the induction of cognitive tuning, the part of the superintendent R-group above the median number of years of experience will score significantly lower with respect to each of the four morphological properties of cognitive structures than that part of the R-group below the median number of years experience.

The discussion of literature as it is related to Hypotheses four and five emphasizes differences in cognitive structures <u>between</u> role types. Little emphasis is given in this discussion to differences <u>within</u> role types based on an individual's experience. However, many of the factors which are related to differences in cognitive complexity between roles also apply to differences in cognitive complexity within roles, particularly when experience (teaching, administrative) is employed as the independent variable. This similarity becomes clear if it is assumed that hierarchies are established within roles (larger school or school system, positions such as Department Head which involve more responsibility, and so on) and that those with more experience are more likely to fill the higher positions in these hierarchies.

As in Hypotheses four and five, therefore, it can be suggested that those persons in the higher positions in a hierarchy, that is, those with more experience, will tend to display larger T-tuning but smaller R-tuning values than those lower in the hierarchy, that is, those with less experience. Application of the "frequency of interaction hypothesis" would lead to a similar conclusion.

<u>Hypothesis 8.1</u>

> Following the induction of cognitive tuning, the doctoral graduate student T-group will score significantly lower than the master's graduate student T-group with respect to each of the four morphological properties of cognitive structures.

Hypothesis 8.2

Following the induction of cognitive tuning, the doctoral graduate student R-group will score significantly higher than the master's R-group with respect to each of the four morphological properties of cognitive structures.

Hypothesis 9.1

Following the induction of cognitive tuning, the transmitting mean scores with respect to each of the four morphological properties of cognitive structures of the master's graduate student T-group will be significantly higher than the scores of the teacher T-group and significantly lower than the scores of the principal T-group.

Hypothesis 9.2

Following the induction of cognitive tuning, the receiving mean scores with respect to each of the four morphological properties of cognitive structures of the master's graduate student R-group will be significantly higher than that of the teacher and principal R-groups.

Hypothesis 9.3

Following the induction of cognitive tuning, the transmitting mean scores with respect to each of the four morphological properties of cognitive structures of the doctoral graduate student T-group will be significantly higher than scores of the principal T-group and significantly lower than the scores of the superintendent T-group.

Hypothesis 9.4

Following the induction of cognitive tuning, the receiving mean scores with respect to each of the four morphological properties of cognitive structures of the doctoral graduate student R-group will be significantly higher than that of the principal and superintendent R-groups.

Differences in cognitive structures may also exist between upward mobile groups, for example, graduate students in educational administration, and those who do not appear to be so upward mobile.

It has already been indicated that there are cognitive tuning differences between administrator groups at different hierarchial levels (as a result of either administrator characteristics or organizational influences). Also mentioned was the fact that those undergraduates who aspired to administrative positions scored lower in cognitive complexity than those who desired to remain as classroom teachers. More specifically, however, the literature on upward mobiles has been reviewed by Tronc (1969).

Employing basically the works of Carlson (1962), Presthus (1962), and Griffiths (1965), Tronc indicates that upward mobility is characterized by a bias toward initiating structure, success at organizing, a view of men "as instruments, pawns to be manipulated (Presthus, 1962, pp. 178-9)," seeing organizational values as decisive, and possessing a procedural rather than a substantive work attitude.

The structural emphasis possessed by upward mobiles suggests that they would score high on both T- and R-tuning. These higher scores would result from the emphasis on specificity by upward mobiles whether transmission or reception was involved. It is important to note here that, in comparison to the preceding hypotheses, a different criteria and a different direction are employed.

Carlson's investigation of the differences in administrative behavior exhibited by two categories of school superintendents is relevant to the present discussion. "Outsiders," or "Career-Bound," superintendents were found

by Carlson to develop new rules of organization to a much greater extent than "Insiders," or "Place-Bound," superintendents. While "Insiders" were concerned in their rule-making with technical and managerial aspects such as maintaining and reinforcing old rules; the "Outsiders" were more likely to modify and redefine the school system, supplanting old rules with new. In other words, the "Outsiders," or upward mobiles, exhibited many of the characteristics that have been shown correlated with high cognitive complexity. Thus we may expect differences <u>within</u> each of the groups employed in the present study. In each group the upward mobiles would be expected to be higher in cognitive complexity than those who are not so upward mobile.

It is suggested, however, that Zajonc's (1954) "expectation of incongruent information hypothesis," has particular relevance for graduate education students' T- and R-tuning scores. Zajonc has shown that when individuals deal with information which is contrary to their knowledge or beliefs, cognitive structures formed from this information demonstrate similar values on the morphological properties whether transmitting or receiving tuning is involved. In general, cognitive structure scores tend to fall when preparing to transmit possible incongruent as compared to congruent information and tend to rise when preparing to receive such information. Zajonc explained this phenomenon in terms of both selective effects and increases in specificity (Supra, pp. 41-42).

As little empirical evidence is available, it can only be suggested that graduate students in educational administration are subject to the expectation of incongruent

information in their communication with peers. If this suggestion is correct, and the writer's experience intimates that it is, then the effect demonstrated by Zajonc would also apply to the graduate groups in the present study. In comparison to other groups tested, the graduate student groups would tend to score lower in cognitive structures under conditions of T-tuning and higher under conditions of R-tuning. It is also suggested that this last effect would be stronger for doctoral than master's graduate student groups.

Two other factors may affect graduate student as compared to other group's cognitive structure scores. First, it has been demonstrated that teachers gain more experience in transmitting whereas students gain more experience in receiving information. The same can be said of a comparison between principals and students. In Anderson and Van Dyke's (1963) study a breakdown of the time principals spent in various forms of communication was as follows: Face-to-face, 37.3 per cent; Telephone, 30.4 per cent; Memos and Letters, 18.0 per cent; Announcements and Bulletins, 13.6 per cent; Formal Reports, 0.9 per cent. The predominance of transmitting as compared to receiving of information is most marked in this breakdown.

The second factor that may affect graduate student as compared to other group's cognitive structure scores concerns subjects' intelligence. Klineberg (1954), after reviewing eight separate studies, reached the conclusion: "In general we may say that the evidence conclusively demonstrates a relationship between socio-economic status as

indicated by occupation and the scores obtained on standard intelligence tests (p. 248)." This finding means that in the present study one can assume that the groups to be used will only be roughly equivalent in intelligence. That is to say, there might be a tendency for higher status personnel, for example, senior administrators, to be more intelligent than the others (Pierce and Merrill, 1957, p. 323). This could be true even though all subjects of all the groups used will have had some higher education and fall into the same broad socio-economic class. Thus, those group differences which do occur in the experiment might be partially due to differences in intelligence--at least that aspect of intelligence which is measured by the standard IQ tests to which Klineberg made reference. It could be suggested, then, that those with higher intelligence, such as graduate students and perhaps those who reach the top positions within an organization, would score higher on measures of cognitive complexity.

However, Tuckman (1966, pp. 377-8) maintains that in no case in his studies were differences in integrative complexity, as measured by the ITI, accountable for on the basis of intelligence, as assessed by the Navy General Classification Test (GCT). On the other hand, Streufert and Schroder (no date) have demonstrated that both scores on the Sentence Completion and Impression Formation tests are significantly ($p < .01$) and positively correlated with intelligence as measured by the Ottis IQ Test. Vannoy (1965),

too, indicates a low but positive correlation between both Schroder's Sentence Completion Test of Integrative Complexity (.23) and Bieri's test of dimensional complexity (.19) and intelligence as measured by the Cooperative School and College Aptitude Test (SCAT). A modified Scott test of cognitive complexity correlated only -.02 with SCAT scores. It would appear that the relationship between intelligence and cognitive complexity is far from clear.

Hypothesis 10.1

> Following the induction of cognitive tuning, those subjects in all T-groups with High Machiavellian scores will score significantly higher with respect to each of the four morphological properties of cognitive structures than those subjects in all T-groups with Low Machiavellian scores.

Hypothesis 10.2

> Following the induction of cognitive tuning, those subjects in all R-groups with High Machiavellian scores will score significantly higher with respect to each of the four morphological properties of cognitive structures than those subjects in all R-groups with Low Machiavellian scores.

If upward mobiles are dominated by a basically "cool" attitude in interpersonal relationships, then the Machiavellian Scale developed by Christie and Geis (1970), which purports to measure manipulativeness, would appear to provide an excellent additional predictor variable of behavior under conditions of T- and R-tuning.

Presthus (1962) describes upward mobiles as having "a view of men as instruments, pawns to be manipulated in a master plan (pp. 178-9)." Henry (1949) describes those

individuals with strong mobility drives as displaying considerable responsiveness to superiors but looking to subordinates in a detached manner, perceiving them as "doers of work" rather than as people. Griffiths (1962) describes upward mobile teachers, or "G. A. S.ers," as displaying a tendency to regard fellow teachers impersonally. Seeman (1958) interprets the findings from his study of superintendents as showing that "Executives who are highly committed to mobility are said by board members to be low in Consideration . . . (p. 637)."

On the other hand, Christie and Geis (1968) describe Machiavellians as manipulators who tend to use people for their own purposes. Machiavellians are basically "cool" in interpersonal relationships and oriented to cognitions rather than to persons. Christie and Geis (1970) maintain that there is overwhelming evidence that high scoring Machiavellians (High Machs) possess a generally unflattering opinion of others and a cynical view of people in general. In fact, the research presented by Christie and Geis (1970) indicates that the primary difference between individuals who score higher and lower on the Mach Scale is the high scorers' greater emotional detachment.

High Machiavellians are resistant to social influence and tend to initiate and control structure. They are preferred as partners, chosen and identified as leaders, judged as more persuasive, and appear to direct the tone and content of interaction--and usually the outcome (Christie and

Geis, 1970, p. 285). This characterization appears more true in open-ended situations in which subjects have greater choice of content and strategy, and true only when the High Machs are intrinsically motivated by the situation. Environmental conditions have an important influence on whether or not Machiavellian tendencies are displayed. On this point, Christie and Geis (1970) state:

> High Machs manipulate more, win more, are persuaded less, persuade others more, and otherwise differ significantly from Low Machs as predicted in situations in which subjects interact face to face with others, when the situation provides latitude for improvisation and the subject must initiate responses as he can or will, and in situations in which affective involvement with details irrelevant to winning distracts Low Machs (p. 312).

In the present study, T-tuning is more likely than R-tuning to provide the necessary conditions for the display of Machiavellian tendencies. Thus, differences between High and Low Machiavellians are more likely to occur under T-tuning than R-tuning.

To reiterate, at a descriptive level the characteristics of upward mobiles and Machiavellians are very similar. There is also some empirical evidence that High Machiavellianism is related to a lack of concern for others. Correlations between a measure of Machiavellianism and Wrightsman's Philosophies of Human Nature Scale (Wrightsman, 1964) indicated a negative relationship ($r = -.54$) between Machiavellianism and Altruism (unselfishness, concern for others). Wrightsman and Cook (1965) performed a factor analysis on seventy-three of the seventy-nine measures completed in a lengthy assessment of 177 female college

students from five colleges in Tennessee. Eight scales emerged with their highest loadings on a factor named "Positive Attitude Toward People." The Machiavellian scale loaded -.52 on this factor.

Christie and Geis (1968) maintain that Machiavellians gravitate to positions of power and are more concerned with means than ends. From studies using the Machiavellian variable, Christie and Geis conclude: "The weight of evidence indicates that individuals who spend more of their time with others in a formal set of roles are more likely to be Machiavellian than those who do not (p. 967)." If this is indeed the case then the Mach Scale developed by Christie to measure Machiavellianism would again appear to provide a useful independent personality measure for the present study.

Studies that have attempted to relate the Mach Scale to other pencil-and-paper tests and to identify the kinds of persons most likely to agree with Machiavelli's precepts have found:

(1) Males are generally more Machiavellian than females.

(2) High Machs do <u>not</u> do better than Low Machs on measures of intelligence or ability.

(3) High Machs, though they are detached from others, are not pathologically so . . . .

(4) Machiavellianism is not related to authoritarianism . . .; there is a basic philosophic difference between these two orientations: the moralistic authoritarian says, "People are no damn good <u>but they should be</u>"; the Machiavellian says, "People are no damn good, <u>so why not take advantage of them</u>?"

(5) High Machs are more likely to be in professions that primarily control and manipulate people . . . .

(6) Machiavellianism is not related to a respondent's occupational status or education, marital status, birth order, his father's socio-economic position, or most other demographic characteristics.

(7) . . . High Machs are likely to come from urban rather than rural backgrounds. In addition, young adults have higher Mach scores than older adults (Christie, 1970, pp. 82-3).

These findings, especially those concerned with sex (most administrators being male), occupation, education, and age, plus the fact that Machiavellianism is not known to correlate with known measures of psychopathology, political ideology, or social class (Christie and Geis, 1968), provide further support for the use of Machiavellianism as an independent personality variable in the present study.

With respect to the age variable, Christie and Geis (1970) state:

> One conclusion is that Mach scores increase from preadolescence to the onset of maturity and then appear relatively stabilized. The lower scores of older adults are hypothesized as representing a clinging to values incorporated at the time of maturity. Available evidence suggests that the younger generation has been subjected to social influences such as increasing urbanization and cosmopolitanism in American society which are condusive to the fostering of manipulative orientations (p. 338).

There also appear to be "theoretical" and empirical links between Machiavellianism and cognitive structure. Harvey _et al.'s_ (1961) System Three individual, for example, is characterized by the ability to objectify and approach problems empirically. He is oriented toward establishing and maintaining intragroup consensus as a step toward dependency and control of others. He "develops fairly high skills in affecting desired outcomes in his world through the technique of having others do it for him (Harvey, 1966,

p. 45)." Bower (1969) found that System Three individuals see themselves as controlling external events. These descriptions of the System Three individual contain elements similar to those used to describe a person scoring high on Machiavellianism.

The only empirical link found between cognitive complexity and the Mach scale was contained in the study by Davis (Harvey, 1966). System Two subjects in Davis' study scored significantly higher than any other group in Machiavellianism.

Direct evidence of relationships between the personal characteristic of manipulativeness, as measured by the Machiavellian Scale, and cognitive structure is meager. However, indirect evidence, through such variables as upward mobility, position of Machiavellians within an organizational hierarchy, and so on, <u>is</u> available. It has been suggested that High as compared to Low scoring Machiavellians tend to be upward mobile and in the higher organizational positions. Therefore, the literature previously reviewed in the development of hypotheses concerned with differences in cognitive structures as a result of subject's upward mobile tendencies or position within an organization can be employed to give direction to hypotheses concerned with Machiavellianism and cognitive structure. Specifically, it is suggested that High scoring Machiavellians will score higher than Low scoring Machiavellians under both conditions of T- and R-tuning.

CHAPTER III

DESIGN OF THE STUDY

In order to examine the problem stated in Chapter One and expanded in terms of the groups employed in the study and ten hypotheses in Chapter Two, a particular research design was employed. This chapter seeks to elaborate upon this design. After a brief description of the sample (analysed in length in Chapter Four), the research methodology used in the study is presented in terms of (1) the experimental induction of cognitive tuning, (2) the required demographic data, and (3) the required personality data. Following discussion of the research methodology, the statistical analysis of data is provided with emphasis given to a priori and a posteriori tests, assumptions underlying tests, and levels of significance used. Finally, the limitations, assumptions, and delimitations of the design are listed and a brief overview of the results of the pilot study are provided.

I. THE SAMPLE

As the sample is analysed in depth in the following chapter, only a brief outline is provided here. Six groups were employed in the study: education undergraduate students, master's graduate students in educational administration, doctoral graduate students in educational administration, teachers, principals, and superintendents.

The undergraduate student group consisted of six intact classes taking Educational Administration 261 at the University of Alberta (N = 157). Classes were randomly assigned to either T- or R-tuning conditions. Graduate student groups consisted of all those in the master's (N = 36) and doctoral (N = 24) programmes in Educational Administration at the University of Alberta. Subjects were randomly assigned to T- or R-tuning. Teachers were obtained from Evening Credit classes from the University of Alberta (N = 72). One of these classes was held in Red Deer and the remainder in Edmonton. Red Deer subjects and Edmonton classes were randomly selected for T- or R-tuning. Principals were obtained from either Evening Credit classes from the University of Alberta or regular meetings of the Edmonton Public and Separate School Boards (N = 56). All principals, except those attending Evening Credit classes, were randomly placed into T- or R-tuning groups. The classes of which principals were a part were randomly assigned to T- or R-tuning conditions. Finally, the superintendent group consisted of forty subjects in attendance at the Annual Conference of the Alberta School Superintendents, Consultants, Supervisors, and Inspectors. These superintendents were randomly split into T- and R-tuning groups.

II. RESEARCH METHODOLOGY

Zajonc's original procedure (1954, pp. 110-2) was followed as closely as possible changing only such things as the experimenter's name, academic affiliation, and so on.

Similarly, the letter employed was changed to make subjects' experiences as similar as possible to those in Zajonc's original sample. The pilot study (Appendix A) contains details of these changes in letter content.

Experimental Induction of Cognitive Tuning

After assembling in a classroom, or a similar suitable location, the subjects were issued the following verbal instructions by the experimenter:

> I am Bill Mulford, a graduate student of the Department of Educational Administration, the University of Alberta. First of all, I want to thank you for helping us with this study. This is a study of how groups operate under certain conditions. I will tell you more about it later.
>
> Before I do, however, I will distribute copies of a real letter which was written by one individual to another. I want you to skim over the letter and get a general idea of what sort of a person the writer is. Just try to imagine what kind of an individual he is, and what are some of the things which are characteristic of him.[9] But please, do not try to memorize the letter. This is not an experiment on memory. We do not try to test your memory, your intelligence or anything of that sort. Just try to get a general picture of the individual who wrote the letter. You will have two minutes to read the letter.

At this point, the letter was distributed face down, a signal was given to begin reading the letter, and, after two minutes, a signal was given to turn the letter face down again. Copies of the letter were then collected. Both the T- and the R-group received the above initial instructions and the letter.

[9] This use of adjectival attributes is somewhat similar to experiments conducted by Asch (1946) and Wishner (Lambert and Lambert, 1964, p. 35). In Zajonc's approach, however, the subjects do not have lists suggested to them. Thus the number and the nature of these attributes is not manipulated by the experimenter and the final results are a consequence of the manner of cognitive structuring typical of the subject under the induced conditions.

As can be seen from Appendix B, the letter is not too precisely structured and there is sufficient room for the selection of information. The general nature of the contents of the letter precludes bias toward the experience or the training of any of the groups, and the instructions included a warning not to memorize the letter. This was done in order to insure that the tuning process had an opportunity to exercise its influence on the cognitive sets. For the same reason, only two minutes were allowed so that the subjects were compelled to select information, rather than to absorb and memorize the letter in its entirety.

To induce the tuning process, different instructions were issued to each group. The T-group received the following instructions:

> Now I will tell you more about this study. I said that we are trying to discover how groups operate under certain conditions. We are especially interested in the process of communication.
>
> At this very moment there is another group in the building. Your responsibility will be to communicate the information you have obtained about the person who wrote the letter to the members of the other group. You will have to describe this person to the other group, so that they can know him as well as you do now.
>
> But before we begin to transmit this information to the other group, we will put down the things we learned about the writer from his letter. I will now distribute forms which you will fill out according to the instructions written on each page.

The R-group was issued the same instructions except the second and third paragraphs were changed to read:

> At this very moment there is another group in the building. They have detailed information on the individual who wrote the letter, and they will communicate this information to you. We want to see how well they can convey to you all the information they have.

> But before we begin to receive this information from the other group, we will put down the things we already learned about the writer from his letter. I will now distribute forms which you will fill out according to the instructions written on each page.

Following these instructions, both groups were given forms from which data on cognitive structures was obtained. A copy of this instrument is attached as Appendix C.

After the subjects had completed the forms, they were asked to complete the Identification Data Sheet (Appendix D), the Attitudes Scale (Appendix E), the C Scale (Appendix F), and the Interpersonal Topical Inventory (Appendix G), and then they were told with an apology that the experiment was over. They were told that the study did not require that they actually communicate and that there was no other group in the building. The purpose of the study was briefly explained, and any questions answered. After the analysis of the data was completed, a letter describing the results was sent to those participants who indicate their desire to receive one.[10] This same procedure was employed with all the groups.

Demographic Data

The Identification Data Sheet was employed in order to obtain the following information about each subject: age, sex, marital status, present occupational position, number of years of teaching experience, number of years of administrative experience, and number of years of professional preparation. This demographic data, particularly that

[10] By including a mailing address on their completed form.

concerning the training and experience of the subject, was used to divide groups for hypothesis testing.

Personality Data

Each subject's score on the Mach V Scale (Machiavellianism) was required. This scale, developed to measure a subject's manipulativeness, was simply referred to as the Attitude Scale in order not to bias responses. In addition to the Mach V, all subjects were required to complete Bieri's adaption of the Role Rep Test (C Scale) and undergraduate students were required to complete the Interpersonal Topical Inventory (ITI). The former test measures a subject's dimensional complexity and the latter inventory places subjects into one of four levels on a concrete-abstract continuum (integrative complexity). Both instruments were employed in an attempt to link Zajonc's tests with current measurement trends in the area of cognitive structure. Each of these three instruments is discussed in detail below.

Attitude Scale. The Attitude Scale (Mach V) was developed by Richard Christie of Columbia University. The scale originated from a content analysis of Machiavelli's The Prince and Discourses. From the content analysis, seventy-one items were written and presented in a Likert format to 1,196 college undergraduates in three different universities. Item analysis indicated that fifty of the items discriminated between high and low scorers on the total scale.

Twenty of the most discriminating items were selected for further research; half were worded so that agreement with them was scored in a pro-Machiavelli direction; the other half were reversals so that disagreement with them was scored to be pro-Machiavelli. This version of the scale was referred to as the Mach IV.

Although the counterbalancing of the items in the Mach IV effectively reduced agreement response set biases, it did not eliminate the effects of social desirability. Respondents making high scores on the Likert format scale (Mach IV) also tended to describe themselves in socially undesirable terms. A forced choice scale, Mach V, was constructed which did not correlate with external measures of social desirability.

In the Mach V scale, each Mach statement is grouped with two other statements similar in tone. One of the others is a "buffer", a statement sounding like a Mach item but which does not correlate with the total score. The second statement is a social desirability item. If the actual Mach item is low in desirability, then the "buffer" is also low while the social desirability item is high. If the Mach item is high in desirability, the "buffer" is also high but the social desirability item would still be preferred by those who always choose to act in the most socially acceptable manner.

Subjects select the response in each set of three that they agree with most or think is most true and then the response that they disagree with most or think is least true. One

response in each set of three is left blank. The scoring system, outlined below, takes full advantage of the fact that it is probably more Machiavellian to say the Mach item is most true and the matched item least true -- a two-step difference -- than to say the Mach item is most true and omit the matched item or omit the Mach item and say the matched item is least true -- a one-step difference.

The following item scoring is used when the Mach item is worded in the pro direction:

Mach Item	Matched Item	Score
Most true	Least true	7
Most true	Omitted	5
Omitted	Least true	5
Omitted	Most true	3
Least true	Omitted	3
Least true	Most true	1

When the Mach item is worded in the anti direction, the scoring is also reversed, 1, 3, 5, 7, from top to bottom.

Christie and Geis (1970) comment on this intricate scoring procedure:

> In practice it has been found that this intricate scoring system and the hidden nature of the forced choice makes it difficult for the average respondent to decide what the "right" answer is (p. 21).
>
> . . . Shortly after Mach V was developed, an advanced graduate sociology class in methodology taught by Paul F. Lazarsfeld was told the principle underlying the scoring method but was only told that the test was designed to measure agreement with Machiavelli. These students could not identify the keyed items (pp. 21 & 25).

> . . . Singer (1968, personal communication) gave the scale in a variety of ways after a standard administration, for example: "Take it as if you wanted to make a good impression on an employer"; "After reading the Appendix in Whyte's The Organization Man (1956) on how to fake on a test, fake low on this test"; and more interestingly, "Read the scale, decide what it means, and then make a high score on it." None of these procedures yielded scores which differed significantly from those using the standard instructions (pp. 25-6).

Information on the reliability and validity of the various Mach scales is difficult to find in summarized form,[11] however the following quotations from Christie and Geis (1970, 1968) are relevant.

> The first nine samples tested on Mach IV had a mean split-half reliability of .79 (1970, p. 16).

> In most samples the reliability of Mach V hovers in the .60's. . . . There is one point that should be noted, however, the elimination of both response set and social desirability tends to decrease scale reliabilities (1970, p. 27).

> Most of the subsequent validation studies did in fact indicate that scores were related to various measures of interpersonal manipulative skill. In an experiment involving the largest number of subjects (N = 66) with a clear-cut definition and measure of success in manipulation, the Con Game, a correlation of +.71 was found between combined scores on Mach IV and V and the number of points won in bargaining in a triad. This is one of the highest correlations between a paper-and-pencil measure of an individual variable and an objective measure of individual behavior with which we are familiar (1970, p. 359).

> Results indicate no substantial correlation with Edwards' or Crowne and Marlowe's scales of social desirability (1968, p. 962).

> Translations of items . . . appear to be relevant enough to differentiate reliably among respondents who

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[11]The pilot study, carried out prior to the present study, indicated a test-retest reliability on the Mach V Scale of .77 (See Appendix A).

> are given an opportunity to agree or disagree with them (1968, pp. 971-2).
>
> Endorsement of such items does not appear to be systematically correlated with known measures of psycholpathology, political ideology, or social class (1968, p. 972).

It was also found that items from the Mach V Scale, mixed in a questionnaire with Mach IV and Anomia test items, were related after being subjected to a factor analysis using a varimax rotation (Christie and Geis, 1968, p. 968). Factor analyses were performed on responses from a representative national sample of 1,482 adults and 1,782 students in fourteen widely assorted colleges. It was tentatively concluded that there were three identifiable factors in Mach IV, Mach V, and Anomia. One was characterized by a tendency to agree with positively keyed items from Mach IV and Anomia which have a diffuse negativistic content about society. A second factor was based upon items from Mach IV and Mach V dealing with ways of interpersonal manipulation ("Machiavellian Tactics"). The third factor contained items from Mach V and negatively keyed items from Mach IV and Anomia. They dealt essentially with the goodness or badness of man ("Machiavellian Orientation") (Christie and Geis, 1970, pp. 359-387).

C Scale. The C Scale is a technique for measuring cognitive complexity. It was adopted from Bieri's modification of the Role Rep Test (Tripodi & Beiri, 1963). Briefly, this test consisted of a matrix down the side of which the subject

was asked to list ten people who conformed to the following role descriptions: yourself, person you dislike, mother, person you'd like to help, father, friend of the same sex, friend of the opposite sex, person with whom you feel most uncomfortable, boss, person difficult to understand. Each of the different role types were selected by Bieri to be representative of the meaningful persons in the judge's social environment. A list of ten paired antonyms appeared along the bottom of the matrix with the numbers -3 to +3 appearing between each pair. The ten sets of bipolar constructs were selected on the basis of being representative of the dimensions elicited from college-trained subjects.

A subject was asked to work vertically down the matrix and rate each person according to the antonyms appearing at the bottom of the column. For example, the first set of antonyms was "outgoing-shy". A subject rated each of the ten persons chosen on a scale from +3 (outgoing) to -3 (shy). Following this, a subject rated all ten persons on the second construct dimension, and so on, through all ten construct dimensions.

This scoring procedure yielded a matrix of numbers which represented how the subject perceived and differentiated a group of persons relative to his personal constructs. Each time a construct number was duplicated in a row it was given a score of 1. The total of these scores for the entire matrix yielded the subject's cognitive complexity score. Scores could range from forty to 450. A score of 450 would indicate

that the subject gave the same rating on all bipolar constructs to all of the role types. This subject would be relatively cognitively simple because he is using his construct dimensions in an identical manner to construe all the individuals on the grid. On the other hand, a person with a score of forty is presumed to be cognitively complex because he uses constructs differently in discriminating among people. The actual range in this study was sixty-five to 263.

Tripodi and Bieri (1963) have obtained evidence to support the assumption that comparable complexity indices are derived from one's own constructs (such as in Zajonc's tests) and from provided constructs (such as in Bieri's test). Several other studies have provided similar evidence (Kieferle & Sechrest, 1961; Jaspars, 1964). The test-retest reliability in the Tripodi and Bieri experiment for cognitively complex scores based on provided constructs was .86 ($p < .001$) and for cognitive complexity based on own constructs .76 ($p < .001$).

While the basic judgements that subjects make in the matrix may be analyzed with different forms of analytic procedures, including factor analysis and multidimensional scaling, Vannoy (1965) has reported the Bieri matching procedure to be highly related to more involved analytic methods. In addition, Irwin, Tripodi, and Bieri (1967) have reported comparable results with the matching procedure when different forms of stimulus judgements are employed. Finally, correlations between the Marlowe-Crowne Social Desirability

scale and Bieri's measure of cognitive complexity range from .04 to .18, all nonsignificant (Irwin, Tripodi, & Bieri, 1967, p. 447).

Bieri (1968) summarizes the results of a variety of empirical efforts that have used his scale:

> Using the concept of structure as a mediating variable, there is evidence that the judge with more structure in his system of perceiving others (i.e., the more cognitively complex judge) will discriminate better among inconsistent stimuli, will prefer and be more certain of his judgements based upon inconsistent information, and will inject greater conflict into his judgements (p. 640).

Interpersonal Topical Inventory. The Interpersonal Topical Inventory (ITI) is a forced-choice measure of integrative complexity devised by Tuckman (1966). The scoring procedure allows an experimenter to classify a subject into one of four conceptual systems on the basis of the number of responses he makes belonging to each system. Subjects are instructed to select one alternative from each of thirty-six pairs. Of the seventy-two alternatives, eighteen fall into each of four conceptual systems increasing in complexity (concrete to abstract functioning) from System One to System Four. Subjects are assigned to the highest system in which they score (if they reach at least the eighth decile of the norm group of 387 first-year Psychology students at the University of Alberta (Garneau, 1970, p. 45)). Six stems are used in the ITI (When I am criticized . . .; When I am in doubt . . .; When a friend acts differently towards me . . .; This I believe about people . . .; Leaders . . .; When other people find fault with me . . .) with six of the forced-choice

pairs following each stem. In Tuckman's (1966) words, the stems are "meant to confront the individuals with interpersonal conflict, ambituity, and the imposition of control (p. 373)."

The ITI was designed by Tuckman as an objectively-scored replacement for a sentence completion test with similar stems (Schroder _et al_, 1967). A contingency coefficient of .54 was reported by Tuckman (1966, p. 378) between his ITI and Schroder's Paragraph Completion Test (N = 92).

A revised scoring system developed by Gardiner (1968) used a continuous distribution of scores based on one point for each "more complex" alternative the subject chooses. Thus a possible range of minus to plus thirty-six is established, with a higher positive score indicating higher complexity. Gardiner found a correlation of .57 between the ITI thus scored and the Paragraph Completion Test. The ITI is shown in Appendix G. Pilot work for the present study indicated a test-retest reliability of .82 with ITI Type and .77 with ITI Score.

III. STATISTICAL ANALYSIS

A Priori Tests

Consistent with _a priori_ comparison procedures outlined by Winer (1962, pp. 85 & 89), the hypotheses were tested through the individual comparison of means, using the _t_-test (Ferguson, 1959, pp. 136-9) and the F-test (Winer, 1962, pp. 33-6) for the homogeneity of variance. Where the test

for homogeneity was not supported, a Welch prime correction (Ferguson, 1966, pp. 172-3) was employed.

A Posteriori Tests

A Posteriori tests of cognitive structure scores by age, sex, and marital status involved the use of *t*-test, F-tests for homogeneity of variance and, where tests for homogeneity were not supported, Welch prime corrections. Pearson correlation coefficients were also employed with the age and cognitive structure data in order to check on *t*-test results without involving possible loss of data. Relationships among the various cognitive structure measures were examined by utilizing Pearson correlation coefficients and their associated probability levels.

For comparisons involving the four ITI Types, one-way analyses of variance and Newman-Keuls comparisons among pairs of ordered means were employed. Comparisons of role types' Machiavellian scores were also analysed by means of analysis of variance and the Newman-Keuls technique. However, when looking for possible predictors of Machiavellianism, *t*-tests and Pearson correlation coefficients were applied.

Finally, chi-square tests, *t*-tests, and one-way analyses of variance were employed for intact group, sample, and population comparisons.

Assumptions Underlying Tests

Because of the nature of the samples employed in the present study, a brief discussion of the failure to meet

assumptions underlying the *t*-test and analysis of variance follows.

T-test. Use of the *t*-test is based on two major assumptions. Firstly, it is assumed that the distributions of the variables in the populations from which the samples are drawn are normal. Secondly, the population variances are assumed to be equal.

Glass and Stanley (1970) maintain that violation of the assumption of normality in the *t*-test "had been shown only to have trivial effects on the level of significance and power of tests and hence should be of no cause for concern (p. 297)." With regard to the violation of the homogeneity of variance assumption, Glass and Stanley state:

> If n_1 and n_2 are equal, violation of the homogeneous variances assumption is unimportant and need not concern us . . . . When a study in which $U_1 - U_2$ is to be estimated cannot be designed so that $n_1 = n_2$, and one suspects that the two populations have substantially different variances, recourse should be made to methods developed by Welch . . . (p. 297).

In the present study, the majority of analyses using the *t*-test contained samples of equal sizes. Also, a computer programme was used which computed variances and applied the Welch prime test wherever variances were shown to be unequal. The Welch prime test requires the normal calculation of a *t* value (dividing the difference between means by their standard error). This value is then referred to the table of *t* using a formula to adjust the number of degrees of freedom.

Analysis of variance (ANOVA). The assumptions made about the analysis of variance are that scores are sampled at random from normal populations with equal variances, and that the different samples are independent (Glass and Stanley, 1970, p. 340). As with the *t*-test, it has been found that the ANOVA is quite robust even if its underlying assumptions are violated. Glass and Stanley state:

> When the sample sizes are equal, the effect of heterogeneous variances on the level of significance of the F-test is negligible (p. 372).
>
> Many years of study have shown clearly that the effects of nonnormality on the nominal level of significance of the F-test are extremely slight (p. 372).

For all analyses of variance in the present study, the Keeping (1962, p. 214) test for homogeneity of variance was applied. The results of these tests indicated that, in most cases, homogeneity of variance requirements were met and in those instances where the criterion was exceeded, deviations from homogeneity were generally not extreme.

Levels of Significance

Winer (1962) maintains that "no absolute standards can be set up for determining the appropriate level of significance and power that a test should have (p. 13)." He continues:

> The frequent use of the .05 and .01 levels of significance is a matter of a convention having little scientific or logical basis. When the power of tests is likely to be low under these levels of significance, and when type 1 and type 2 errors are of approximate equal importance, the .30 and .20 levels of significance may be more appropriate than the .05 and .01 levels (p. 13).

Bearing in mind Winer's statements, the experimental nature of the present study, the small N's employed in some

[illegible]

samples, and in order to provide a more accurate picture of significance test results, the actual levels of probability (or as close to the actual probability as was possible, for example, with chi-square tables) have been reported.

IV. LIMITATIONS, ASSUMPTIONS, AND DELIMINATIONS

Limitations

1. The groups were not completely random samples. In most cases appropriate personnel had to be used in their existing groups even though these groups were formed for purposes other than this experiment. Thus, while subjects or groups were assigned at random to T- or R-tuning, this process of allotting group membership was restricted by practical considerations.

2. The procedure did not examine the administrator's behavioral acts of communication (for example, speaking) but rather his cognitive preparations for these acts.

3. Although interpretation of the findings could move in this direction, the procedure was not specifically designed to determine if an administrator's cognitive tuning was "better" or "worse" than that of other groups. It was designed to determine if it was significantly "different".

4. The procedure did not measure administrator cognitive tuning characteristics with respect to information specifically pertaining to the administrative function.

Assumptions

1. The procedure used was assumed to possess a degree of validity[12] and reliability suitable for the study.

2. It was assumed that the groups, although not completely random samples, were representative of their respective populations and adequate to the purpose of the study.[13]

Deliminations

1. Only Education undergraduates, Educational Administration graduate students, Evening Credit Course teachers and principals, Edmonton Public and Separate School Board principals, and superintendents attending the Annual Conference of Alberta School Superintendents were used.

2. All groups, except for an Evening Credit Course consisting of teachers, were located in Edmonton, Alberta, at the time of their tests. The Evening Credit Course was located in Red Deer, Alberta.

V. PILOT STUDY[14]

Results of a pilot study carried out prior to the present study with four intact classes of undergraduate (N=110) and two intact classes of after-degree (N=40) education students indicated that:

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[12] As tested and proven by Zajonc (1954, pp. 68-96).

[13] The matter of the representativeness of the groups is taken up again in the next chapter.

[14] For full details of the pilot study see Appendix A.

1. With minor modifications in the directions for the Complexity measure, Zajonc's instrument was suitable for use in the present study.

2. Zajonc's letter needed to be revised in order to give respondents in the present study as similar an experience as possible to Zajonc's original sample. To this end, dates, salary, and vacation time were updated and names changed to fit the Canadian context.

3. Except for the Unity property of cognitive structure, the differences between T- and R-tuning were similar to those attained by Zajonc. There was no significant difference indicated on the Unity property.

4. Test-retest analyses offered support for the reliability of the ITI and the Mach V.

5. The lack of significant differences between two intact classes of T-tuned and two intact classes of R-tuned undergraduates offered support for the position that inferences could be made from non-random but intact groups of subjects.

6. Correlation coefficients among cognitive tuning scores, ITI scores, and Mach V scores indicated few significant relationships. However, there were indications of significant relationships between Unity and ITI ($r = .23$, $p < .10$) Complexity and ITI ($r = -.13$, $p < .10$), and Unity and Mach V under conditions of T-tuning ($r = .21$, $p < .05$).

7. There was tentative support, from a comparison of undergraudate and after-degree students' T- and R-tuning scores, that increased training (that is, more years in

university) results in high scores on Differentiation, Complexity, and Organization, but lower scores on Unity.

The present study could be considered experimental in nature. Only a limited number of studies exist which have sought differences between those individuals who became educational administrators at various levels and those who remained as teachers. Also, to a certain extent, the study can be considered hypothesis-generating. Before hypotheses can be tested concerning relationships between personality characteristics and occupational role behavior, for example, it is necessary to ascertain whether distinctive personality characteristics exist for the occupational groups of concern.

The pilot study was carried out in order to provide evidence about the applicability of the variables chosen and the instruments employed to measure these variables, the value of intact groups as opposed to random samples, and the possible direction of hypotheses. Findings from the pilot study suggested the feasibility of further study.

CHAPTER IV

THE SAMPLE

The purpose of this chapter is to supply a description of the samples employed in the present study. In order to provide information for replication, each of the samples has been briefly described on a number of demographic variables. Reasons are given for the selection of certain intact groups, and comparisons between intact groups comprising some samples are outlined. The ability to generalize from results is then further examined by comparing each sample to its appropriate population with respect to a number of available demographic variables.

Undergraduate Control Group

Description. The control groups were University of Alberta students taking Educational Administration 261. These students were suitable because: (1) they had a minimum of teaching or administrative experience; (2) they were the first groups tested in an attempt to replicate Zajonc's original findings; (3) permission to use them was more easily acquired than if students from another faculty or taking a course from a different department were employed.

The education undergraduate sample contained six intact classes. Care was taken to select pairs of classes which were taught by the same instructor and which had class

periods long enough to answer the various questionnaires involved. One class from each pair was then randomly selected for T-tuning and the other for R-tuning.

The mean age, years of university experience, years of administrative experience, and years of teaching experience for the total sample (N=157) were 21.8, 0.58, 0.00, and 0.23 respectively. Males formed 43.3 per cent of the total sample. Over seventy-seven per cent (77.1 per cent) of the sample were single and 20.4 per cent were married.

Intact group comparison. One-way analyses of variance were carried out using the three T-tuned and the three R-tuned classes on each of the four cognitive structure properties. As the results of these analyses indicate (Tables 2 and 3), there were no significant differences among intact groups beyond the p = .612 level. In all cases, in fact, the F values were extremely small thus indicating the closeness of the groups. Further analyses on the measures of Machiavellianism and cognitive complexity also failed to indicate any appreciable differences among the intact classes.

Support for the addition of the intact classes to form a larger sample and for the possibility of making inferences from this sample was thus obtained.

Sample to population comparison. Data were not available on which comparisons could be made to all education undergraduates at the University of Alberta. However, as all education students take Educational Administration 261 and

TABLE 2

Analysis of Variance of Degree of Cognitive Structure under Conditions of T-tuning Classified on the Basis of Three Intact Groups of Undergraduate Education Students

Property	Group		MS	DF	F	P
	#	$\bar{X}$				
D*	1**	9.31	1.51	2	0.16	.856
	2	9.58	9.70	82		
	3	9.10				
C	1	22.56	0.27	2	0.00	.997
	2	21.75	82.87	82		
	3	21.59				
U	1	.27	0.00	2	0.15	.858
	2	.26	0.03	82		
	3	.28				
O	1	21.01	28.56	2	0.12	.883
	2	20.44	229.67	82		
	3	22.43				

*D = Differentation; C = Complexity; U = Unity; O = Organization.

**1 (N = 32); 2 (N = 24); 3 (N = 29).

TABLE 3

Analysis of Variance of Degree of Cognitive Structure under Conditions of R-tuning Classified on the Basis of Three Intact Groups of Undergraduate Education Students

Property	Group #	Group $\bar{X}$	MS	DF	F	P
D	1*	8.13	0.99	2	0.12	.980
	2	8.08	8.51	69		
	3	7.76				
C	1	18.43	5.84	2	0.08	.921
	2	17.58	70.78	69		
	3	18.44				
U	1	.27	0.01	2	0.49	.612
	2	.29	0.02	69		
	3	.25				
O	1	15.50	1.22	2	0.02	.985
	2	15.76	78.77	69		
	3	15.31				

*1 (N = 23); 2 (N = 24); 3 (N = 25).

because of the size of the sample (37.4 per cent of those presently taking this course), the sample is assumed to be representative of the population.

Teacher Groups

Description. The teacher groups were extremely difficult to bring together via a random sampling and a special meeting at a pre-arranged time and place. Teacher groups, however, gathered of their own volition for Evening Credit Classes from the University of Alberta. A number of these Evening Credit classes were employed in the present study. Again, permission to use Education classes was more easily obtained than for other university classes.

The total teacher sample (N=72) contained subjects from three Evening Credit classes in Educational Administration at the University of Alberta in Edmonton and one Evening Credit class in Educational Foundations conducted by the University of Alberta in Red Deer. The intact groups in Edmonton were randomly assigned to either T- or R-tuning conditions. Subjects in the larger Red Deer class were randomly placed into a T- or R-tuning group.

The mean age of the total teacher sample was 32.5. The mean years of teaching, administrative, and university experience were 7.1, 1.1, and 4.0 respectively. Males comprised 70.8 per cent of the sample. Nearly eighty-nine per cent (88.9 per cent) were married and 9.7 per cent were single.

Intact group comparison. Because of the small n's involved, little meaningful comparison could be made among all intact teacher groups. A comparison that was possible, however, was the one between subjects in the two geographic locations who were taking different education courses.

Table 4 summarizes the results of t-test analyses between the combined Edmonton Evening Credit classes in Educational Administration and the Red Deer class in Educational Foundations on the four cognitive structure properties. No differences beyond the $p = .441$ level were indicated for the T-tuning data. For the R-tuning data, however, there was a tendency for the Edmonton group to score higher on cognitive properties, especially the Complexity ($p = .154$) dimension.

Some possible explanations may be offered for these differences between the two intact teacher R-groups. Thirteen of the fourteen subjects in the Edmonton R-tuning group were male, whereas only thirteen of the twenty-two Red Deer R-tuning subjects were male. Six Edmonton and two Red Deer R-tuned subjects either had or were working toward a graduate degree. And, eleven Edmonton and twelve Red Deer R-group teachers aspired to administrative positions. Each of these variables, sex, graduate training, and upward mobility, are employed in later analyses to help account for high R-tuning scores.

Sample to population comparison. Ratsoy (1970) has supplied extensive demographic data on the Alberta population

TABLE 4

T-Test Comparisons of Degree of Cognitive Structure under T- and R-tuning Conditions for Two Intact Teacher Groups

Property	Edmonton Sample $\overline{X}$ Score	Red Deer Sample $\overline{X}$ Score	t	P (two-tailed)
Transmitting	(N = 21)	(N = 15)		
D	9.67	9.33	0.40	.695
C	21.90	22.73	-0.34	.739
U	.21	.20	0.39	.697
O	20.28	22.83	-0.83	.441*
Receiving	(N = 14)	(N = 22)		
D	8.36	7.64	0.91	.369
C	20.29	16.68	1.46	.154
U	.23	.24	-0.06	.951
O	18.23	13.10	1.52	.212*

*Welch correction.

of teachers. This data provided the information on which the teacher sample employed in the present study and the population were compared. Table 5 summarizes the breakdown of both the sample and the population by age, years of teaching experience, years of university, sex, and marital status. Whenever possible, that is, where cells could be made to equal five or more, chi-square comparisons between sample and population were carried out. These chi-squares, along with their respective degrees of freedom and probability levels, are also reported in Table 5.

It is clear that the sample differs greatly from the population on all variables examined.

In order to describe in more detail how the sample differed from the population, and because of the large proportion of males in the teacher sample (70.8 per cent), the sample to population comparisons were further analysed by sex classifications. Table 6 contains the comparisons using male teachers and Table 7 the comparisons using female teachers.

The male sample was not greatly different from the male population of teachers on the variables of marital status and years of university ($p = .50$). They tended, however, to be very much younger (51.0 per cent falling in the 26-30 age range) and have less teaching experience (43.1 per cent falling in the 5-9 years category) than the population. On the variables of age ($p = .50$) and marital status ($p = .70$) the female sample did not differ greatly

TABLE 5

Chi Square Comparisons of Teacher Sample (N = 72) with Population (N = 18,074) on Selected Demographic Variables

Variable		Percentage				
Name	Classification	Sample	Population	DF	X^2	P
Age	-21	0.0	0.7	4	32.75	.001
	21-25	12.5	19.7			
	26-30	44.4	19.9			
	31-35	12.5	11.7			
	36-40	12.5	9.4			
	41-45	12.5	9.5			
	46-55	4.2	16.1			
	56-65	1.4	12.1			
	66+	0.0	0.9			
Years of Teaching	1	2.8	8.6	4	28.32	.001
	2	6.9	7.3			
	3-4	29.2	13.9			
	5-9	37.5	24.5			
	10-14	12.5	14.2			
	15-19	6.9	11.2			
	20-24	2.8	8.4			
	25-34	1.4	8.1			
	34+	0.0	3.6			

TABLE 5 (continued)

Variable		Percentage				
Name	Classification	Sample	Population	DF	X^2	P
Years of University	-2	2.8	17.6	3	9.82	.05
	2-3	31.9	31.5			
	4	33.3	30.9			
	5	22.2	11.9			
	6+	9.7	8.1			
Marital Status	Married	88.9	71.3	1	7.58	.01
	Single	9.7	20.6			
	Other	1.4	6.2			
Sex	Male	70.8	38.8	1	30.20	.001
	Female	29.2	61.2			

TABLE 6

Chi Square Comparisons of Male Teacher
Sample (N = 51) with Male Population of Teachers
(N = 6,761) on Selected Demographic Variables

Variable Name	Variable Classification	Percentage Sample	Percentage Population	DF	X^2	P
Age	-21	0.0	1.4	3	23.33	.001
	21-25	3.9	10.8			
	26-30	51.0	17.1			
	31-35	13.7	16.0			
	36-40	17.7	11.8			
	41-45	11.8	13.9			
	46-55	0.0	20.4			
	56-65	2.0	7.1			
	66+	0.0	1.5			
Years of Teaching Experience	1	3.9	8.9	2	8.83	.02
	2	3.9	7.2			
	3-4	25.5	14.6			
	5-9	43.1	27.5			
	10-14	15.7	13.7			
	15-19	3.9	10.0			
	20-24	2.0	6.9			
	25-34	2.0	6.8			
	34+	0.0	4.4			
Years of University	-2	0.0	2.5	3	3.60	.50
	2-3	13.7	20.2			
	4	43.1	41.0			
	5	29.4	21.3			
	6+	13.7	16.0			
Marital Status	Married	96.1	81.2			
	Single	2.0	17.0			
	Other	2.0	1.8			

TABLE 7

Chi Square Comparisons of Female Teacher Sample (N = 21) with Female Population of Teachers (N = 10,702) on Selected Demographic Variables

Variable Name	Variable Classification	Percentage Sample	Percentage Population	DF	X^2	P
Age	-21	0.0	1.0	2	2.22	.50
	21-25	33.3	23.5			
	26-30	28.6	15.5			
	31-35	9.5	8.6			
	36-40	0.0	7.6			
	41-45	14.3	9.5			
	46-55	14.3	18.4			
	56-65	0.0	14.8			
	66+	0.0	1.1			
Years of Teaching Experience	1	0.0	8.3	2	6.20	.05
	2	14.3	7.4			
	3-4	38.1	13.4			
	5-9	23.8	22.5			
	10-14	4.8	14.6			
	15-19	14.3	12.4			
	20-24	4.8	9.3			
	25-34	0.0	9.0			
	34+	0.0	3.1			
Years of University	-2	9.5	27.2			
	2-3	76.2	39.3			
	4	9.5	24.5			
	5	4.8	5.9			
	6+	0.0	3.1			
Marital Status	Married	71.4	65.0	1	0.17	.70
	Single	28.6	26.1			
	Other	0.0	8.9			

from the female population. However, the female sample tended to have fewer years of teaching and university experience than the female population.

It was disappointing to find that the teacher sample employed in the present study was not representative of the Alberta population of teachers on the variables examined. However, it was felt that the sample may be representative of one section of the Alberta teaching force; the section of most relevance in a study of educational administrators. This section is the one containing a large proportion of young, married, well trained, aspiring males, in other words, the section containing a majority of potential educational administrators.

The non-representative nature of the teacher sample must be considered a limitation of the present study.

Principal Groups

Description. Similar to the problem of collecting appropriate teacher samples was that of collecting principal samples. Fortunately, members of this professional group also gathered of their own volition for several Evening Credit classes at the University of Alberta or meetings arranged by the Edmonton Public and Separate School Boards. Permission to use the personnel involved was obtained from the respective instructors or school board officials.

The majority of principals (N=37) employed in the present study were from an intact group attending a regular

monthly meeting at the Edmonton Public School Board office. A smaller number of principals were obtained from a zone meeting of the Edmonton Separate School Board (N=11) and the various Evening Credit classes at the University of Alberta (N=8). All subjects, except for those attending the Evening Credit classes, were randomly placed into T- or R-tuning groups. The classes of which Evening Credit subjects were a part were randomly assigned to T- or R-tuning conditions.

The mean age, years of teaching experience, years of administrative experience, and years of university training for the total principal sample (N=56) were 43.9, 9.9, 10.1, and 5.3 respectively. Males made up 91.1 per cent of the sample. Nearly eighty-eight per cent (87.5 per cent) of the sample were married and 7.1 per cent were single.

Intact group comparison. The small n's in groups other than that formed by the Edmonton Public School Board principals precluded any meaningful intact group comparisons.

Sample to population comparison. Through unpublished data supplied by Ratsoy (1971, personal communication) comparisons between the principal sample and the Alberta population of principals on selected demographic variables were made. Table 8 summarizes the variable breakdowns (and chi-square analyses) of both the sample and the population by age, years of experience in education, sex, and marital status.

In all cases, the chi-square tests indicated great

TABLE 8

Chi Square Comparisons of Principal Sample (N = 56) with Principal Population (N = 1074) on Selected Demographic Variables

Variable Name	Variable Classification	Percentage Sample	Percentage Population	DF	X^2	P
Age	21-25	1.8	1.9	5	1.49	.95
	26-30	7.1	8.9			
	31-35	12.5	13.8			
	36-40	17.9	13.6			
	41-45	17.9	15.2			
	46-55	25.0	26.6			
	56-65	17.9	19.6			
	65+	0.0	0.4			
Years of Experience in Education	1	0.0	0.6	5	4.90	.50
	2	0.0	0.5			
	3-4	1.8	3.2			
	5-9	14.3	14.7			
	10-14	19.6	16.5			
	15-19	10.7	17.3			
	20-24	23.2	14.8			
	25-34	19.6	19.1			
	34+	10.7	13.3			
Degree Held	Bachelor or less	69.6	68.1	1	0.08	.80
	More than Bachelor	30.4	31.9			
Marital Status	Married	87.5	82.1	2	1.17	.70
	Single	7.1	9.2			
	Other	5.4	8.7			
Sex	Male	91.1	83.6	1	2.12	.20
	Female	8.9	16.4			

similarity between the sample and the population. It was concluded that, on the variables examined, the sample of principals used in the present study was representative of the Alberta population of principals.

Senior Administrator Group

Description. Fortunately, all of Alberta's superintendents gathered of their own volition for the Annual Conference of School Superintendents, Consultants, Supervisors, and Inspectors. Permission to use the personnel belonging to the Alberta School Superintendents' Association was obtained from its President and the Alberta Department of Education. During the conference, forty members of the association agreed to participate in the study and they were split randomly into T- and R-tuning groups. A number of other senior administrators, other than superintendents, also participated in the study but it was decided not to include them in the sample.

The mean age, years of teaching experience and years of administrative experience for the total superintendent sample were 48.48, 10.23, and 15.58 respectively. All superintendents were male, 95.0 per cent were married, 10.0 per cent held a doctoral degree, 72.5 per cent held a master's degree, and 17.5 per cent held a bachelor's degree.

Intact group comparison. The sample contained only one group of superintendents.

Sample to population comparison. Data were available on both the Albertan (Weleschuk 1969) and Canadian (Sampson, 1965) populations of superintendents. Chi-square comparisons with each of these populations and the sample on a breakdown of the variables of age, teaching and administrative experience (total educational experience in the national comparison), degree held, sex, and marital status, indicated how similar were the sample and each population (Tables 9 and 10). It was noted, however, that the sample subjects tended to have less teaching experience and higher university degrees than the Albertan population of superintendents. The latter emphasis was to be expected. For, as Morin (1964, p. 38) indicates, the highest rates of return (or in the present study, the more likely volunteers) are realized in those cases where respondents have themselves undertaken thesis work in Education.

On the variables examined, it was concluded that the superintendent sample employed in the present study was representative of both the Albertan and Canadian populations of superintendents.

Graduate Students Group

Description. The samples of graduate students consisted of all individuals in the master's and doctoral programmes in Educational Administration at the University of Alberta. Subjects were randomly placed in T- or R-groups. The mean age, years of teaching experience, years of

TABLE 9

Chi Square Comparisons of Superintendent
Sample (N = 40) with Alberta Superintendent
Population (N = 69) on Selected Demographic Variables

Variable Name	Variable Classification	Percentage Sample	Percentage Population	DF	X^2	P
Age	30-39	20.0	30.4	2	2.21	.50
	40-49	35.0	27.5			
	50-59	30.0	36.2			
	60+	15.0	5.8			
Years of Teaching Experience	0-2	10.0	0.0	2	6.32	.05
	3-5	10.0	5.8			
	6-8	25.0	21.7			
	9-12	25.0	11.6			
	13-16	10.0	30.4			
	17-20	15.0	17.4			
	21+	5.0	13.0			
Years of Administrative Experience	0-2	2.5	5.8	5	1.58	.95
	3-5	7.5	7.3			
	6-8	10.0	10.1			
	9-12	17.5	13.			
	13-16	25.0	29.0			
	17-20	12.5	8.7			
	21+	25.0	26.1			
Degree Held	Bachelor's	17.5	31.9	2	5.41	.10
	Master's	72.5	62.3			
	Doctorate	10.0	5.8			
Sex	Male	100.0	100.0			
	Female	0.0	0.0			
Marital Status	Married	95.0	98.5			
	Single	5.0	1.5			
	Other	0.0	0.0			

TABLE 10

Chi Square Comparisons of Superintendent
Sample (N = 40) with Canadian Superintendent
Population (N = 464) on Selected Demographic Variables

Variable		Percentage				
Name	Classification	Sample	Population	DF	X^2	P
Age	26-30	2.5	2.2	4	2.14	.80
	31-35	12.5	5.8			
	36-40	7.5	6.7			
	41-45	17.5	16.8			
	46-50	17.5	23.5			
	51-55	5.0	23.1			
	56-60	27.5	10.6			
	61-65	10.0	9.1			
	66+	0.0	2.4			
Years of Experience in Education	6-10	2.5	2.8	4	3.05	.70
	11-15	17.5	10.8			
	16-20	12.5	9.3			
	21-25	22.5	16.8			
	26-30	7.5	22.6			
	31-35	12.0	19.6			
	36-40	10.0	11.6			
	40+	7.5	6.5			
Degree Held	Bachelor's	17.5	23.9	1	1.20	.30
	Master's	72.5	72.8			
	Doctorate	10.0	2.4			
Sex	Male	100.0	98.5			
	Female	0.0	1.5			
Marital Status	Married	95.0	94.4			
	Single	5.0	4.3			
	Other	0.0	1.3			

administrative experience, and years of university for the master's group (N=36) were 32.9, 5.5, 5.6, and 5.7 respectively. Similar means for the doctoral group (N=24) were 36.0, 5.8, 5.6, and 7.8 respectively. One of the master's students was female and one of the doctoral students was divorced. The remainder of subjects in the graduate samples were male and married.

Intact group comparison. The master's sample consisted of only one intact group. On the other hand, the doctoral group contained both first and second year students. The small n's involved in analysis of these intact doctoral groups precluded any meaningful comparisons.

Sample to population comparison. As the Department of Educational Administration at the University of Alberta in Edmonton contains by far the largest graduate school in educational administration in Alberta, and because all master's and doctoral students in this Department were tested, the sample was assumed to be representative of the population. This representativeness may also extend to the Canadian scene but data for such comparisons were not available.

Summary

This chapter has supplied a description of the samples employed in the present study. Each sample has been briefly described on available demographic variables. Reasons were given for the selection of certain intact groups and comparisons between intact groups comprising some samples were

outlined. The ability to generalize from results was then further examined by comparing each sample with its respective population.

Intact undergraduate control groups were not significantly different from one another on the four cognitive structure properties. The two intact teacher R-groups, however, tended to differ from one another. The Edmonton Educational Administration R-group scored higher on three cognitive properties than the Red Deer Educational Foundations R-group. Possible reasons for this discrepancy in cognitive structure scores between the two groups were the greater proportion of males, of subjects with or working toward graduate degrees, and of subjects with aspirations to administrative positions in the Edmonton as compared to the Red Deer R-group.

No other intact group comparisons were carried out. The superintendent and master's student samples contained only one intact group whereas analyses with the principal and doctoral student intact groups would have contained such small n's as to make comparisons meaningless.

Because of the large N's involved relative to the population, undergraduate control and graudate student samples were assumed to be representative of their respective Albertan populations. The principal sample was found to be highly representative of the Albertan population of principals. The superintendent sample was found to be representative of both the Albertan and Canadian populations of superintendents,

although the sample tended to have less teaching experience and higher university degrees than the Albertan population.

The teacher sample differed from the Albertan population of teachers on all variables examined. The sample tended to consist mainly of married males, twenty-six to thirty years of age, with three to nine years of teaching experience, a large number of whom were working toward a graduate degree. Males in the sample did not differ from the population with respect to marital status or years of university training, however, they tended to be younger and have less teaching experience than the population. Female teachers in the sample did not differ from the population with respect to age and marital status, but they did have less years of teaching experience and university training.

Except for the teacher sample, then, the intact group and sample to population comparisons were most rewarding. Results of these comparisons provide evidence to support the position that inferences can be made from the samples employed in the present study even though subjects had not been randomly selected.[15] The nonrepresentative nature of the teacher sample to its population must be considered a limitation of the present study. It is suggested, however, that the teacher sample contained a large proportion of prospective educational administrators and thus is of considerable interest for later analyses.

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[15]The similarity of Von Fange's (1961) and Plaxton's (1965) results with different samples of administrators leads to a similar conclusion.

CHAPTER V

HYPOTHESES TESTING

The purpose of this chapter is to test hypotheses developed in Chapter Two. All hypotheses were analysed using *t*-tests, F tests for homogeneity of variance, and the Welch prime correction technique where variances were shown to differ beyond the .05 level.

Testing Hypothesis 1.0

Hypothesis 1.0 was concerned with the similarity of differences from T- and R-undergraduate groups on the four morphological cognitive structure properties between the study sample and Zajonc's (1954) original sample. It was hypothesized that the sample used in the present study would demonstrate similar differences in cognitive structure between T- and R-tuning as did Zajonc's original sample. Results of the *t*-test analyses are presented in Table 11.

Findings. Zajonc (1954) found differences between the T- and R-group scores at the .001 level on the properties of Differentiation (t = 5.12) and Complexity (t = 6.83), at the .01 level on Organization (t = 2.94), and at the .05 level with the property of Unity (t = -2.19). Except for the Unity property, then, the sample employed in the present study indicated similar differences in cognitive structures between T- and R-tuned groups as Zajonc's original sample. Consistent with

TABLE 11

T-test Comparisons of Control T- and R-tuning Groups on the Four Cognitive Properties

Property	$\overline{X}$ T-Score	$\overline{X}$ R-Score	t	P (one-tailed)
D	9.32	7.99	2.78	.003
C	21.62	18.15	2.50	.007
U	.27	.27	0.15	.440
O	21.33	15.52	2.90	.001*

*Welch correction.

the pilot study results, however, there were no significant differences found on the Unity property.

Discussion. It was concluded that, apart from the Unity property, Zajonc's results had been replicated. This conclusion permitted further proposed comparisons based on Zajonc's theoretical framework and methodology.

Testing Hypotheses 2.1 and 2.2

Hypothesis two was concerned with comparisons between teacher and control groups on the four cognitive properties under conditions of both T- or R-tuning. Specifically, it was hypothesized that:

> 2.1 Following the induction of cognitive tuning, the teacher T-group will score significantly higher than the control T-group with respect to scores on each of the four morphological properties of cognitive structures.
>
> 2.2 Following the induction of cognitive tuning, the teacher R-group will score significantly lower than the control R-group with respect to scores on each of four morphological properties of cognitive structures.

Results of the *t*-test analyses of data are reported in Table 12.

Findings. Except for the Unity property, the hypotheses that there would be significant differences between teacher and control groups on the four cognitive properties under conditions of both T- and R-tuning were not supported. On the Unity property, undergraduate education students scored higher than teachers under both T-tuning ($p = .007$) and R-tuning ($p = .127$). The finding on the Unity property under R-tuning is in the hypothesized direction.

TABLE 12

T-test Comparisons of Teacher and Control Group Scores on the Four Cognitive Properties Under Conditions of T- and R-tuning

Property	Teacher $\bar{X}$ Score	Control $\bar{X}$ Score	t	P (one-tailed)
T-Tuning				
D	9.53	9.32	0.36	.359
C	22.25	21.62	0.37	.356
U	.21	.27	-2.15	.007*
O	21.34	21.33	0.00	.497*
R-Tuning				
D	7.92	7.99	-0.13	.450
C	18.08	18.15	-0.04	.483
U	.24	.27	-1.15	.127
O	15.10	15.52	-0.23	.411

*Welch correction.

Discussion. The finding that Unity decreases from undergraduate students to teachers under T-tuning may be explained in terms of increased age. Lewin (1936) has indicated that as a person develops, more and more attributes gain independence from one another. As the individual grows older he ceases to respond to all the changes in the environment, he becomes more and more selective and less unified.

Testing Hypotheses 3.1 and 3.2

Hypothesis three examined the cognitive characteristics of teachers above and below the median years of teaching experience (5.5 years) under both T- and R-tuning. Specifically, it was hypothesized that:

> 3.1 Following the induction of cognitive tuning, the part of the teacher T-group above the median number of years of experience will score significantly higher with respect to each of the four morphological properties of cognitive structures than that part of the T-group below the median number of years of experience.
>
> 3.2 Following the induction of cognitive tuning, the part of the teacher R-group above the median number of years of experience will score significantly lower with respect to each of the four morphological properties of cognitive structures than that part of the R-group below the median number of years of experience.

Results of the *t*-test analyses are summarized in Table 13.

Findings. Under conditions of T-tuning, and employing the conventional .05 level of significance, no significant differences were found between teachers above and below the median number of years of teaching experience. However, there was a tendency for teachers below the median years of teaching

TABLE 13

T-test Comparisons of Teachers Above and Below the Median Years of Teaching Experience on the Four Cognitive Properties Under Conditions of T- and R-tuning

Property	Below Median $\overline{X}$ Score	Above Median $\overline{X}$ Score	t	P (one-tailed)
T-tuning				
D	9.56	9.50	0.07	.474
C	22.67	21.83	0.34	.367
U	.23	.19	1.20	.120
O	20.18	22.50	-0.76	.226
R-tuning				
D	8.67	7.17	2.03	.025
C	20.11	16.06	1.70	.046*
U	.21	.27	-1.30	.049
O	18.18	12.02	1.90	.033

*Welch correction.

[illegible]

[illegible]

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
				[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
				[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible]

experience to score higher on Unity than those above the median ($p = .120$). Therefore, Hypothesis 3.1 was not supported.

Under R-tuning conditions, Differentiation, Complexity, and Organization scores of teachers below the median years of teaching experience were significantly higher ($p < .05$) than these same scores for teachers above the median years of teaching experience. Thus, for these three properties, Hypothesis 3.2 was supported. On the Unity property, under R-tuning conditions, the more experienced teachers scored significantly higher ($p < .05$) than the less experienced teachers.

Discussion and further analysis. The findings with the teacher T-groups suggest that, excluding Unity, the effects of transmission tuning were strong enough to cancel out any cognitive complexity differences between the more and less experienced teachers. Or, alternatively, there were in fact no significant cognitive complexity differences between more and less experienced teachers. The result on the Unity property under T-tuning was consistent with the increased age rationale offered for the results obtained in the testing of Hypothesis 2.1. Under R-tuning, however, findings were reversed; the more experienced teachers scored significantly higher ($p=.049$) on the Unity property than the less experienced teachers.

In order to clarify the effects of age and/or teaching experience on cognitive structures, teachers above and below the median age (29.5 years) were examined on each of the four

cognitive properties. Results of these comparisons are summarized in Table 14.

Under conditions of T-tuning, the significant difference on Unity (p = .048) between teachers above and below the median age was in the same direction found with the analysis by teaching experience; teachers below the median scored significantly higher than those above the median. Under R-tuning, however, no significant differences were indicated beyond the .575 level on any of the morphological properties.

Combining findings of differences in teacher cognitive structures classified by teaching experience and age, it can be concluded that under T-tuning the increased Unity for more experienced teachers can also be accounted for by increased age. Under R-tuning, differences on all morphological properties, including Unity, are more likely to occur when the sample is analysed in terms of teaching experience than age.

Testing Hypotheses 4.1 and 4.2

Hypothesis four was concerned with principal and teacher cognitive structure comparisons. It was hypothesized that:

> 4.1 Following the induction of cognitive tuning, the principal T-group will score significantly higher than the teacher T-group with respect to each of the four morphological properties of cognitive structures.
>
> 4.2 Following the induction of cognitive tuning, the principal R-group will score significantly lower than the teacher R-group with respect to each of the four morphological properties of cognitive structures.

Results of _t_-test analyses are summarized in Table 15.

TABLE 14

T-test Comparisons of Teachers Above and Below the Median Age on the Four Cognitive Properties Under Conditions of T- and R-tuning

Property	Below Median $\overline{X}$ Score	Above Median $\overline{X}$ Score	t	P (one-tailed)
T-tuning				
D	9.28	9.78	-0.60	.552*
C	21.67	22.83	-0.48	.634
U	.25	.17	2.05	.048
O	20.47	22.21	-0.57	.573
R-tuning				
D	8.06	7.78	0.36	.724
C	18.11	18.06	0.02	.982
U	.22	.25	-0.57	.575
O	15.28	14.92	0.11	.917

*Welch correction.

TABLE 15

T-test Comparisons of Principal and Teacher Group Scores on the Four Cognitive Properties Under Conditions of T- and R-tuning

Property	Principal $\bar{X}$ Score	Teacher $\bar{X}$ Score	t	P (one-tailed)
T-tuning				
D	9.00	9.53	-0.88	.192
C	19.89	22.25	-1.30	.099
U	.23	.21	0.71	.240
O	22.67	21.34	0.41	.351*
R-tuning				
D	7.00	7.92	-1.65	.052
C	16.21	18.08	-1.03	.153
U	.34	.24	2.51	.007
O	12.47	15.10	-1.20	.103*

*Welch correction.

Findings. At the conventional .05 significance level, there were no significant differences between principal and teacher T-groups on any of the cognitive properties. There was a tendency for the teacher T-group to score higher on Complexity than the principal T-group ($p = .099$). On the whole, however, Hypothesis 4.1 was not supported.

Under T-tuning, principals scored lower than teachers on the properties of Differentiation ($p = .052$), Complexity ($p = .153$), and Organization ($p = .103$), and higher than teachers on Unity ($p = .007$). Therefore, on the properties of Complexity, Organization, and, especially, Differentiation. Hypothesis 4.2 was supported. For the Unity property, Hypothesis 4.2 was not supported; as was the tendency in previous hypotheses, the direction of the difference was the reverse of that hypothesized.

Discussion and further analysis. The continued tendency for differences in scores on the Unity property to act in an opposite to hypothesized direction prompted an analysis of relationships among the four cognitive properties. The inter-correlation matrix of these properties for all R-tuned subjects in the present study is reported in Table 16. Results for the T-tuning data are similar.

It is clear from the data presented in Table 16 that strong positive relationships exist among Differentiation, Complexity, and Organization, and that negative relationships exist between Unity and Differentiation, and Unity and Organization. Zajonc (1954) demonstrated similar relationships among the Differentiation, Complexity, and Organization

TABLE 16

Intercorrelation Matrix and Probabilities of the Four Cognitive Properties for all R-tuned Subjects (N = 172)

Property	Differentiation	Complexity	Unity	Organization
D	1.00	.00*	.14	.00
C	.92	1.00	.47	.00
U	-.11	-.05	1.00	.00
O	.71	.66	-.36	1.00

*P's above and r's below diagonal.

properties. These relationships among the morphological properties help to emphasize why differences in scores on the Unity property tent to act in an opposite direction to those on the remaining three properties.

Testing Hypotheses 5.1 and 5.2

Superintendent and principal samples were compared under both T- and R-tuning conditions to determine if differences existed on cognitive tuning characteristics. It was hypothesized that:

> 5.1 Following the induction of cognitive tuning, the superintendent T-group will score significantly higher than the principal T-group with respect to each of the four morphological properties of cognitive structures.
>
> 5.2 Following the induction of cognitive tuning, the superintendent R-group will score significantly lower than the Principal R-group with respect to each of the four morphological properties of cognitive structures.

Results of t-test analyses are summarized in Table 17.

Findings. All results, except for those on Unity under T-tuning, were in the hypothesized directions. Under T-tuning conditions, superintendents scored significantly higher on Differentiation (p = .052) and tended to score higher on Complexity (p = .119) and Organization (p = .121) than principals. T-tuning Unity scores were very similar for both groups. Under R-tuning, superintendents scored significantly lower on Unity (p = .024) and tended to score lower on Complexity (p = .057) than principals. Differentiation and Organization means, although falling in the expected direction, tended to be similar for both R-groups.

The findings suggest that Hypothesis 5.1 was supported

TABLE 17

T-test Comparisons of Superintendent and Principal Group Scores on the Four Cognitive Properties Under Conditions of T- and R-tuning

Property	Supt. $\overline{X}$ Score	Principal $\overline{X}$ Score	t	P (one-tailed)
T-tuning				
D	10.10	9.00	1.66	.052
C	22.15	19.89	1.20	.119
U	.22	.23	-0.32	.375
O	28.73	22.67	1.19	.121
R-tuning				
D	6.80	7.00	-0.35	.365
C	13.60	16.21	-1.47	.057*
U	.24	.34	-2.04	.024
O	12.13	12.47	-0.17	.431

*Welch correction.

on the properties of Differentiation, Complexity, and Organization and that Hypothesis 5.2 was supported on the properties of Complexity and Unity.

Discussion. Results of the analyses for Hypothesis 5.1 supply the first consistent evidence of differences in cognitive structures between role groups under Transmission conditions. The high Unity score for principals under R-tuning can be attributed mainly to those principals above the median years of administrative experience (See results of Hypothesis 6.2, Table 18).

Testing Hypotheses 6.1 and 6.2

Hypothesis six examined the cognitive characteristics of principals above and below the median number of years of administrative experience (8.5 years) under both T- and R-tuning. Specifically, it was hypothesized that:

> 6.1 Following the induction of cognitive tuning, the part of the principal T-group above the median number of years of experience will score significantly higher with respect to each of the four morphological properties of cognitive structures than that part of the T-group below the median number of years of experience.

> 6.2 Following the induction of cognitive tuning, the part of the principal R-group above the median number of years of experience will score significantly lower with respect to each of the four morphological properties of cognitive structures than that part of the R-group below the median number of years experience.

Results of the *t*-test analyses are reported in Table 18.

Findings. At the .05 level and under conditions of T-tuning, no significant differences were found between principal groups above and below the median number of years of administrative experience. On the Organization property,

[illegible]

TABLE 18

T-test Comparisons of Principals Above and Below the Median Years of Administrative Experience on the Four Cognitive Properties Under Conditions of T- and R-tuning

Property	Below Median $\overline{X}$ Score	Above Median $\overline{X}$ Score	t	P (one-tailed)
T-tuning				
D	8.93	9.07	-0.16	.436
C	19.71	20.07	-0.13	.449
U	.25	.21	0.82	.209
O	18.35	26.98	-1.39	.082*
R-tuning				
D	7.50	6.50	1.30	.096*
C	16.93	15.50	0.54	.299
U	.27	.41	-2.05	.024*
O	14.25	10.68	1.46	.078

*Welch correction.

there was a tendency for more experienced principals to score higher than the less experienced principals ($p = .082$), that is, in the hypothesized direction. Results on the Differentiation and Complexity measures were also in the hypothesized direction but F values were extremely small. Except for results with the Organization property, then, Hypothesis 6.1 was not supported. There was an indication that differences in Differentiation ($p = .096$) and Organization ($p = .078$) scores fell in the hypothesized direction under R-tuning; principals below the median in years of administrative experience scoring higher than those above the median. The difference in scores on the Complexity dimension was also in the expected direction but this difference did not reach significance ($p = .299$). The difference in Unity scores under R-tuning indicates significantly ($p = .024$) greater scores for the more experienced principals. Thus, hypothesis 6.2 only tends to be supported for the Differentiation and Organization dimensions of cognitive structures.

Discussion and further analysis. As hypothesized, increased administrative experience among principals resulted in greater Organization scores under T-tuning and lower Differentiation and Organization scores under R-tuning. Under R-tuning, the more experienced principals also scored extremely high on Unity; their score of .41 was twice as high as under T-tuning. Assuming that principals above the median number of years of administrative experience are also older than principals below the median (the Pearson *r* for

years of administrative experience and age for principals under R-tuning was .76), this higher Unity score cannot be explained in terms of either increased age or the rationale developed for Hypothesis 6.2. An examination of the Unity R-tuning raw data indicated that the four highest scores of principals above the median had a mean of .69, whereas the remaining ten scores in this group had a mean of .30. Apart from these wide variations in scores, no other suggestions can be made for the high Unity scores by principals under conditions of R-tuning.

Testing Hypotheses 7.1 and 7.2

Hypothesis seven examined the cognitive characteristics of superintendents above and below the median number of years of administrative experience (14.5 years) under both T- and R-tuning conditions. Specifically, it was hypothesized that:

> 7.1 Following the induction of cognitive tuning, the part of the superintendent T-group above the median number of years experience will score significantly higher with respect to each of the four morphological properties of cognitive structures than that part of the T-group below the median number of years experience.
>
> 7.2 Following the induction of cognitive tuning, the part of the superintendent R-group above the median number of years experience will score significantly lower with respect to each of the four morphological properties of cognitive structures than that part of the R-group below the median number of years experience.

Table 19 summarizes the results of *t*-test analyses.

Findings. No significant differences were found between the cognitive structure scores of superintendents above and below the median years of administrative experience

TABLE 19

T-test Comparisons of Superintendents Above and Below the Median Years of Administrative Experience on the Four Cognitive Properties Under Conditions of T- and R-tuning

Property	Below Median $\overline{X}$ Score	Above Median $\overline{X}$ Score	t	P (one-tailed)
T-tuning				
D	10.30	9.90	0.39	.351
C	21.80	22.50	-0.29	.389
U	.21	.22	-0.10	.462
O	29.46	27.99	0.17	.432
R-tuning				
D	7.20	6.40	0.96	.174
C	14.90	12.30	1.33	.100
U	.25	.22	0.42	.339
O	13.75	10.51	1.10	.142

under conditions of T-tuning. Therefore, Hypothesis 7.1 was not supported.

Differences in the morphological properties between superintendents above and below the median years of administrative experience under R-tuning were all in the expected direction; superintendents above the median years of experience scored lower than those below the median. However, only on the Complexity ($p = .100$) and Organization ($p = .142$) properties did differences approach significance. It was concluded that Hypothesis 7.2 was tentatively supported on the Complexity and Organization properties.

Discussion. As hypothesized, increased administrative experience among superintendents under conditions of R-tuning resulted in more flexible cognitive structures. However, the low size of F values suggest that this conclusion must be interpreted with care.

Testing Hypotheses 8.1 and 8.2

Hypothesis eight examined the differences in cognitive structure between master's and doctoral students in Educational Administration under both T- and R-tuning. It was hypothesized that:

> 8.1 Following the induction of cognitive tuning, the doctoral graduate student T-group will score significantly lower than the master's graduate student T-group with respect to each of the four morphological properties of cognitive structures.

8.2 Following the induction of cognitive tuning, the doctoral graduate student R-group will score significantly higher than the master's graduate student R-group with respect to each of the four morphological properties of cognitive structures.

Table 20 outlines the results of *t*-test analyses.

Findings. Under T-tuning conditions, doctoral students, when compared to master's students, scored lower on Differentiation, Complexity, and Unity, and higher on Organization. Under R-tuning, the direction of differences was repeated; doctoral students scored lower than master's students on Differentiation, Complexity, and Unity but higher on Organization. However, only differences on Complexity ($p = .043$) under T-tuning and Complexity ($p = .052$) and Unity ($p = .013$) under R-tuning reached a significance level of .05 or better. Thus, it can be concluded that Hypotheses 8.1 was only partly supported and that Hypothesis 8.2 tended to be contradicted.

Discussion and further analysis. The direction of the differences indicated between doctoral and master's student scores on the morphological properties under T-tuning are consistent with the "expectation of incongruent information hypothesis" offered by Zajonc (1954); the higher the expectation of incongruent information the lower Differentiation and Complexity scores and the higher Organization scores. However, R-tuning results tend to be more consistent with the evidence which indicated that the more intelligent are more cognitively complex and thus would score lower on the morphological

TABLE 20

T-test Comparisons of Doctoral and Master's Students in Educational Administration on the Four Cognitive Properties Under Conditions of T- and R-tuning

Property	PhD $\overline{X}$ Score	MEd $\overline{X}$ Score	t	P (one-tailed)
T-tuning				
D	9.08	9.83	-0.59	.279
C	17.50	24.00	-1.78	.043
U	.26	.30	-0.65	.262
O	24.29	19.60	0.62	.285*
R-tuning				
D	8.92	9.72	-0.84	.205
C	19.92	25.89	-1.68	.052
U	.19	.28	-2.05	.013*
O	20.38	18.81	0.35	.373*

*Welch correction.

properties than the less intelligent.

Both doctoral and master's student samples increased dramatically in their R-tuning scores. This increase in scores under R-tuning is also consistent with the "expectation of incongruent information hypothesis". In order to show this increase more clearly, doctoral students' T- and R-tuning scores were compared and master's students' T- and R-tuning scores were compared. Table 21 summarizes the *t*-test analyses of these T- versus R-tuning comparisons. The only difference to approach significance was on the Unity property for doctoral students ($p = .123$) with transmitters scoring higher than receivers.

Testing Hypotheses 9.1, 9.2, 9.3, and 9.4

Hypothesis nine was concerned with possible trends in cognitive structure scores among teachers, master's students, and principals on the one hand, and principals, doctoral students, and superintendents on the other. Specifically, it was hypothesized that following the induction of cognitive tuning:

> 9.1 The transmitting mean scores with respect to each of the four morphological properties of cognitive structures of the master's student group will be significantly higher than the scores of the teacher group and significantly lower than the scores of the principal group.
>
> 9.2 The receiving mean scores with respect to each of the four morphological properties of cognitive structures of the master's student group will be significantly higher than that of the teacher and principal groups.

TABLE 21

T-test Comparisons of Doctoral and Master's T- and R-tuning Groups on the Four Cognitive Properties

Property	$\bar{X}$ T-Score	$\bar{X}$ R-Score	t	P (one-tailed)
Doctoral Students				
D	9.08	8.92	0.16	.439
C	17.50	19.92	-0.71	.244
U	.26	.19	1.19	.123
O	24.29	20.38	0.44	.322
Master's Students				
D	9.83	9.72	0.10	.459
C	24.00	25.89	-0.54	.295
U	.30	.28	0.43	.334
O	19.60	18.81	0.19	.422

9.3 The transmitting mean scores with respect to each of the four morphological properties of cognitive structures of the doctoral student group will be significantly higher than the scores of the principal group and significantly lower than the scores of the superintendent group.

9.4 The receiving mean scores with respect to each of the four morphological properties of cognitive structures of the doctoral student group will be significantly higher than that of the principal and superintendent groups.

Table 22 summarizes the results of t-test analysis on the teacher-master's student-principal comparisons and Table 23 the results of t-test analysis on the principal-doctoral student-superintendent comparisons.

Findings. For master's students under conditions of T-tuning, differences were indicated on the Unity property with teachers ($p = .009$) and principals ($p = .058$), and on the Complexity property with principals ($p = .057$). On the Unity property, master's students scored higher than either teachers or principals and on Complexity they scored higher than principals. Combined with the results of the analysis of Hypothesis 4.1 (Table 15), the following trends were indicated under conditions of T-tuning: (1) Differentiation and Complexity increase from principals to teachers and then to master's students; (2) Organization increases from master's students to teachers and then to principals. However, only on the Complexity property are differences between pairs of samples beyond the .10 level of significance. Given these findings, it can be concluded that Hypothesis 9.1 was not supported.

Findings with respect to master's students under conditions of R-tuning indicated significantly ($p < .008$)

TABLE 22

T-test Comparisons of Teacher and Master's Student and Principal and Master's Student Scores on the Four Cognitive Properties Under Conditions of T- and R-tuning

Property	MEd	Teacher	Principal	Comparisons			
	$\bar{X}$ Score	$\bar{X}$ Score	$\bar{X}$ Score	MEd-Teacher		MEd-Principal	
				t	P (one-tailed)	t	P (one-tailed)
T-tuning							
D	9.83	9.53	9.00	0.37	.357	0.97	.188*
C	24.00	22.25	19.89	0.73	.234	1.61	.057
U	.30	.21	.23	2.45	.009	1.61	.058
O	19.60	21.34	22.67	-0.53	.322*	-0.63	.265
R-tuning							
D	9.72	7.92	7.00	2.50	.008	3.77	.000
C	25.89	18.08	16.21	3.16	.001	3.74	.001*
U	.28	.24	.34	1.04	.152	-1.16	.126
O	18.81	15.10	12.47	1.32	.007	2.75	.004

*Welch correction.

TABLE 23

T-test Comparisons of Principal and Doctoral Student and Superintendent and Doctoral Student Scores on the Four Cognitive Properties Under Conditions of T- and R-tuning

Property	PhD	Principal	Supt.	Comparisons			
	$\overline{X}$ Score	$\overline{X}$ Score	$\overline{X}$ Score	PhD-Principal		PhD-Supt.	
				t	P (one-tailed)	t	P (one-tailed)
T-tuning							
D	9.08	9.00	10.10	0.10	.462	-1.08	.144
C	17.50	19.89	22.89	-0.89	.189	-1.82	.057*
U	.26	.23	.22	0.52	.301	0.67	.253
O	24.29	22.67	28.73	0.23	.408	0.56	.290
R-tuning							
D	8.92	7.00	6.80	2.68	.005	2.97	.003
C	19.92	16.21	13.60	1.50	.071	2.99	.007*
U	.19	.34	.24	-2.70	.000*	-1.21	.118
O	20.38	12.47	12.13	2.28	.051*	2.09	.047*

*Welch correction.

higher Differentiation, Complexity, and Organization scores for master's students when compared to either teachers or principals. Combined with the findings of Hypothesis 4.2 (Table 15), the trend indicated was for Differentiation, Complexity, and Organization to increase under R-tuning from principal to teacher and then to master's student. On the Unity property under R-tuning, the master's students fell between the teachers (lowest score) and principals; the difference between master's students and teachers being at the .152 level of significance and between the master's students and the principals at the .126 level of significance. Except for the Unity property, then, it can be concluded that Hypothesis 9.2 was supported.

Under T-tuning conditions, there were no significant ($p < .05$) differences between the doctoral student and principal samples. However, superintendents tended to score higher on Differentiation ($p = .144$) and Complexity ($p = .057$) than doctoral sutdents. Combining these last findings with results of analyses for Hypothesis 5.1 (Table 17), a trend was evident on the Complexity dimension; Complexity increased from doctoral student to principal and then to superintendent samples. Organization scores tended to increase from principal to doctoral student and then to superintendent samples, but all probability levels were low. On the whole, it can be concluded that Hypothesis 9.3 was not supported.

Under R-tuning, doctoral students scored significantly higher ($p < .07$) than either principals or superintendents on

Differentiation, Complexity, and Organization. Combined with the results of the analysis of Hypothesis 5.2 (Table 17), the trend indicated was for Differentiation, Complexity, and Organization to decrease from doctoral student to principal and then to superintendent samples. On the Unity property under R-tuning, doctoral students scored well below either principals ($p = .000$) or superintendents ($p = .118$). Combined with the results of the analysis of Hypothesis 5.2 (Table 17), Unity increased significantly ($p < .10$) from doctoral student to superintendent and then to principal samples. Except for the Unity property, then, Hypothesis 9.4 was supported.

Discussion and further analysis. For both master's and doctoral students, in comparison to teachers, principals, or superintendents, the effects of the "expectation of incongruent information" are again readily apparent. Graduate training in Educational Administration appears to contribute to rigid cognitive structures. This rigidity is especially acute under conditions of receiving information. Examination of the T- and R-tuning scores of the Edmonton intact group of teachers and the Red Deer intact group of teachers (Table 4, Chapter IV) further supports this conclusion.

The Edmonton intact group of teachers, which contained subjects taking graduate Educational Administration Evening Credit classes, when compared with the Red Deer group, which contained subjects taking an undergraduate class in Educational Foundations, demonstrated little difference between

T- and R-tuning scores. T-test analyses employing these Edmonton and Red Deer intact groups of teachers classified by T- and R-tuning indicated: (1) no significant differences ($p < .05$) between Edmonton T- and R-tuning groups, although there was a tendency for Differentiation scores to be higher under T- than R-tuning ($p = .081$); (2) significant differences ($p < .01$) between Red Deer T- and R-tuning groups on the Differentiation, Complexity, and Organization properties, but no significant difference on the Unity property ($p = .183$).

Testing Hypotheses 10.1 and 10.2

Hypothesis ten was concerned with the effects of subjects' Machiavellian tendencies on cognitive structure. It was hypothesized that following the induction of cognitive tuning:

> 10.1 Those subjects in all T-groups with High Machiavellian scores will score significantly higher with respect to each of the four morphological properties of cognitive structures than those subjects in all groups with Low Machiavellian scores.
>
> 10.2 Those subjects in all R-groups with High Machiavellian scores will score significantly higher with respect to each of the four morphological properties of cognitive structures than those subjects in all groups with Low Machiavellian scores.

Table 24 summarizes the results of *t*-test analyses. Subjects obtaining a score of 106 or above on the Mach V Scale were classified as High Machiavellians and those scoring ninety-six or below were classified as Low Machiavellians. These scores were selected in order to divide the total sample into three approximately equal groups under either T- or R-tuning conditions.

TABLE 24

T-test Comparisons of Subjects Scoring High and Low in Machiavellianism on the Four Cognitive Properties Under Conditions of T- and R-tuning

Property	High Machs $\overline{X}$ Score	Low Machs $\overline{X}$ Score	t	P (one-tailed)
T-tuning	(N = 71)	(N = 64)		
D	9.35	9.39	-0.08	.467
C	21.30	21.27	0.02	.491
U	.27	.21	2.12	.016*
O	21.15	23.46	-0.94	.175
R-tuning	(N = 60)	(N = 56)		
D	8.60	7.41	2.38	.010
C	20.32	16.36	2.55	.006
U	.27	.27	-0.02	.491
O	16.44	14.85	0.89	.187

*Welch correction.

Findings. Under T-tuning conditions, High Machs scored significantly higher than Low Machs on the Unity property ($p = .016$). Scores on the three remaining cognitive properties tended not to differ between High and Low Machs. Apart from the Unity property, then, Hypothesis 10.1 was not supported.

Under R-tuning, High Machs scored higher than Low Machs on Differentiation, Complexity, and Organization. The differences on Differentiation and Complexity were highly significant ($p = .010$ and $p = .006$ respectively). There was no difference between High and Low Machs under R-tuning on the Unity property. Except for this Unity property, then, Hypothesis 10.2 was supported.

Discussion and further analysis. Some danger exists in interpreting the results of Hypothesis Ten solely in terms of differences in Machiavellianism. Differences in cognitive structures among the various role types have already been indicated. If Machiavellianism also differs across the various role samples, and the analysis of variance summarized in Table 25 indicates it does, then differences in cognitive structures may be accounted for in terms of either Machiavellianism or role.

In order to clarify the relationships among the cognitive structure, Machiavellian, and role variables, each role sample was analysed on each of the four cognitive structure dimensions by comparing those scoring above with those scoring below the median Mach score for their respective sample. The median Mach score for the control, teacher, and

TABLE 25

Analysis of Variance of Machiavellian Scores Classified on the Basis of the Six Role Samples

Sample Name	Sample (n)	$\overline{X}$ Mach Score	MS	DF	F	P
PhD	24	106.92	532.40	5	7.42	.000
MEd	36	103.22	71.78	379		
Teacher	72	103.08				
Control	157	102.53				
Principal	56	97.86				
Supt.	40	97.05				

master's student samples was 102 and for the superintendent, principal, and doctoral student samples the median Mach scores were ninety-seven, ninety-nine, and 106 respectively. Table 26 summarizes the *t*-test analyses for T-tuning groups and Table 27 summarizes the *t*-test analyses for R-tuning groups.

Within role samples, a number of results of the Machiavellian comparisons were found to be significant at the .10 level or better. Under T-tuning, it was found that: (1) the Differentiation, Complexity, and Organization scores for teachers and principals were higher for those above the median Mach score; (2) the Organization score for doctoral students was higher for those above the median Mach score; and, (3) the Unity scores for teachers and principals was higher for those below the median Mach score, but for the control group it was higher for those above the median Mach score. Under R-tuning, it was found that: (4) the Differentiation and Complexity scores were higher for control subjects above the median Mach score; (5) the Organization score was higher for doctoral students below the median Mach score; and, (6) the Unity score for principals was higher for those below the median Mach score.

Compared with the analyses employing all High and Low Machiavellian subjects, the analyses employing role types produced different results. Instead of significant differences being more likely to occur under R-tuning, the situation was reversed and significant differences were more likely to occur under T-tuning. In addition, role analysis indicated

TABLE 26

T-test Comparisons of Control, Master's Student, Doctoral Student, Teacher, Principal, and Superintendent Subjects Above and Below the Median Machiavellian Score on the Four Cognitive Properties Under Conditions of T-tuning

Property	Above Median $\bar{X}$ Score	Below Median $\bar{X}$ Score	t	P (one-tailed)
Control				
D	9.40	9.23	0.26	.399
C	22.43	20.84	0.81	.209
U	.30	.24	1.82	.037
O	19.62	23.01	-1.04	.146*
MEd				
D	9.67	10.00	-0.19	.425
C	23.22	24.78	-0.32	.378
U	.34	.26	1.06	.153
O	19.89	19.31	0.08	.469
PhD				
D	9.00	9.17	-0.09	.465
C	15.17	19.83	-0.88	.200
U	.21	.31	-0.91	.193
O	32.43	16.15	1.07	.143*

TABLE 26 (continued)

Property	Above Median $\overline{X}$ Score	Below Median $\overline{X}$ Score	t	P (one-tailed)
Teacher				
D	10.28	8.78	1.89	.034
C	24.83	19.67	2.27	.015
U	.18	.23	-1.23	.113
O	24.52	18.17	2.21	.017
Principal				
D	9.57	8.43	1.35	.095
C	21.43	18.36	1.15	.131
U	.20	.26	-1.23	.114
O	28.47	16.87	1.93	.032
Supt.				
D	10.50	9.70	0.79	.220
C	22.90	21.40	0.62	.272
U	.22	.22	-0.06	.478
O	32.05	25.41	0.80	.218

*Welch correction.

TABLE 27

T-test Comparisons of Control, Master's Student, Doctoral Student, Teacher, Principal, and Superintendent Subjects Above and Below the Median Machiavellian Score on the Four Cognitive Properties Under Conditions of R-tuning

Property	Above Median $\bar{X}$ Score	Below Median $\bar{X}$ Score	t	P (one-tailed)
Control				
D	8.36	7.61	1.11	.133*
C	19.33	16.97	1.21	.115
U	.28	.25	0.89	.188
O	15.39	15.56	-0.13	.450
MEd				
D	9.78	9.67	0.08	.468
C	25.67	26.11	-0.09	.466
U	.29	.26	0.41	.342
O	20.24	17.38	0.66	.259
PhD				
D	8.67	9.17	-0.40	.351
C	18.67	21.17	-0.56	.295
U	.21	.16	0.98	.176
O	14.77	26.00	-1.28	.105*

TABLE 27 (continued)

Property	Above Median $\overline{X}$ Score	Below Median $\overline{X}$ Score	t	P (one-tailed)
Teacher				
D	8.17	7.67	0.64	.262
C	18.17	18.00	0.07	.473
U	.22	.25	-0.67	.255
O	15.43	14.67	0.20	.422
Principal				
D	7.14	6.86	0.36	.360
C	17.29	15.14	0.81	.213
U	.29	.39	-1.52	.070
O	13.63	11.30	0.93	.180
Supt.				
D	6.80	6.80	0.00	.500
C	13.80	13.40	0.20	.424
U	.22	.25	-0.45	.329
O	12.28	11.98	0.10	.461

*Welch correction.

that Machiavellianism affected the various role groups in a different manner. The only consistent evidence of differences was obtained under T-tuning conditions with the teacher and principal samples; the more Machiavellian teachers and principals were more cognitively structured than the less Machiavellian teachers and principals. The different Mach medians of course negated any direct comparison of the various role samples' cognitive structure scores classified by Machiavellianism.

Differences in Mach scores among the various role samples are further analysed in the next chapter.

Summary

This chapter provided results of analyses used in testing the major hypotheses of the study. The next chapter, Chapter Six, provides a posteriori tests of factors arising from these major and other hypotheses.

The undergraduate control sample was found to demonstrate similar differences in cognitive structures between T- and R-tuning conditions as Zajonc's (1954) original sample. Consistent with the pilot study results, however, no significant differences were found on the Unity property. The conclusion that, apart from the Unity property, Zajonc's results had been replicated permitted further analyses based on his theoretical framework and methodology.

Contrary to what was hypothesized, there were no significant differences between teacher and control samples

on the properties of Differentiation, Complexity, or Organization under either T- or R-tuning. Also, contrary to expectation, scores on the Unity property tended to decrease from control to teacher samples. This decrease in Unity was explained in terms of increased age. Correlational analysis indicating a strong negative relationship between Unity and each of the other three properties provided additional information from which to discuss the tendency for differences in scores on the Unity property to act in a direction opposite to that hypothesized.

Teachers below the median years of teaching experience tended to score higher on Unity than those teachers above the median under T-tuning conditions. Apart from this finding with the Unity property, the hypothesis that teachers below the median years of teaching experience would score significantly higher on the cognitive properties than those above the median under T-tuning was not supported.

The hypothesis that under R-tuning the more experienced teachers would score significantly lower on the cognitive properties than the less experienced teachers was supported on the Differentiation, Complexity, and Organization properties. As the correlational analysis would lead one to suspect, however, the more experienced teachers scored significantly higher than the less experienced teachers on the Unity property. Analyses of cognitive tuning scores of teachers by age and a comparison of these findings with these results which used teaching experience indicated that increased Unity

for the more experienced teachers under conditions of T-tuning could also be accounted for by increased age. Under R-tuning, however, all differences on the cognitive properties, including Unity, were more likely to occur when the sample was analysed by teaching experience than by age.

The teacher T-tuning sample tended to score higher than the principal T-tuning sample on the Complexity property. On the whole, however, the hypothesis that principals would score significantly higher than teachers on the cognitive properties under T-tuning was not supported.

On the Complexity, Organization, and, especially, Differentiation properties, the hypothesis that teachers would score higher than principals was supported. Again it was found that results on the Unity property were in a reverse-to-hypothesized direction.

The only consistent evidence across a number of cognitive properties of differences in cognitive structures between role types under T-tuning was indicated by a comparison of superintendent and principal samples. On the properties of Differentiation, Complexity, and Organization, superintendents tended to score significantly higher than principals, that is, in the hypothesized directions.

Under R-tuning, superintendents tended to score significantly lower on Unity and Complexity than principals. Unity scores under T-tuning were very similar, but under R-tuning superintendents scored significantly lower than principals. As indicated in a later hypothesis testing

situation, the high Unity scores for principals under R-tuning could be attributed to those above the median years of administrative experience.

Not including the Organization property, the hypothesis that principals with more administrative experience would score higher in cognitive structure than the less experienced principals under T-tuning was not supported. On the Organization property, there was a tendency for the difference in scores to fall in the hypothesized direction.

Under R-tuning, the Differentiation, Complexity, and Organization property scores of the more experienced principals tended to be significantly lower than these same scores for the less experienced principals, that is, in the hypothesized directions. Differences in Unity scores were reversed with the more experienced principals scoring significantly higher than the less experienced principals. From an examination of the raw data, it appeared that the high mean Unity score for principals under R-tuning could be mainly attributed to four high scoring subjects.

No significant differences were found in cognitive structure between superintendents above and below the median years of administrative experience under conditions of T-tuning. It was concluded that the hypothesis suggesting that the more experienced superintendents would score significantly higher on the cognitive properties under T-tuning than the less experienced superintendents was not supported.

Under R-tuning, the more experienced superintendents scored lower than the less experienced superintendents on all cognitive structure properties, but only differences on the Complexity and Organization properties approached significance. The hypothesis that the more experienced superintendents would score significantly lower on cognitive structure properties under R-tuning than the less experienced superintendents was thus only partly supported.

The direction of differences between doctoral and master's student cognitive structures under T-tuning conditions was consistent with Zajonc's (1954) "expectation of incongruent information hypothesis". Under T-tuning, doctoral students, when compared to master's students, scored lower on Differentiation, Complexity, and Unity, and higher on Organization. Under R-tuning, the direction of these differences was repeated. However, only differences on Complexity under T-tuning and Complexity and Unity under R-tuning reached significance. It was concluded that the hypotheses that doctoral students would score significantly lower under T-tuning and significantly higher under R-tuning than master's students were only partly supported. In addition, R-tuning scores of graduate students in Educational Administration were shown to have increased dramatically when compared to either other samples or to their respective T-tuning scores.

The hypotheses that under T-tuning conditons doctoral student cognitive structure scores would be significantly higher than principal but significantly lower than

superintendent scores, and that master's student cognitive structure scores would be significantly higher than teacher but significantly lower than principal scores, were not supported.

Under R-tuning and on the properties of Differentiation, Complexity, and Organization, the hypotheses that doctoral and master's students would score significantly higher than principals and superintendents, and teachers and principals, respectively, were supported. On the Unity property, the doctoral students tended to score significantly lower than principals and superintendents, and master's students tended to score significantly higher than teachers but significantly lower than principals.

Taking into consideration all subjects tested, Machiavellian scores were found to be significantly and positively related to Unity scores under T-tuning and Differentiation and Complexity scores under R-tuning. However, as significant differences in cognitive structure had already been indicated among various role samples and as Machiavellian scores were also found to vary significantly across samples, some danger existed in interpreting these results solely in terms of Machiavellianism. An analysis of each role sample divided by those scoring above and those scoring below the median Machiavellian score (for each sample) indicated that significant differences were more likely to occur under T-tuning than R-tuning conditions. It was also found that Machiavellianism affected the various role groups cognitive

structure scores in a different manner. Consistent evidence (over all cognitive structure properties) that a subject's Machiavellian tendencies affected his cognitive structures was only obtained with the teacher and principal samples and only under conditions of T-tuning. The more Machiavellian teachers and principals were found to be more cognitively structured than the less Machiavellian teachers and principals.

A summary of hypotheses, whether or not they were supported and, if supported, the level of significance obtained is presented in Table 28. On the Unity property for hypotheses 2.1, 3.2, 4.2, and 6.2, differences between groups were significant beyond the .05 level and for hypotheses 3.1 and 9.2, differences between groups were significantly beyond the .10 level, but in all cases in a reverse-to-hypothesized direction.

TABLE 28

Summary of Supported Hypotheses

Hypothesis Number	T-tuning Property D	C	U	O	Hypothesis Number	R-tuning Property D	C	U	O
1.0	**	**	–	**	1.0	**	**	–	**
2.1	–	–	–	–	2.2	–	–	*	–
3.1	–	–	–	–	3.2	**	**	–	**
4.1	–	–	–	–	4.2	**	*	–	*
5.1	**	*	–	*	5.2	–	*	**	–
6.1	–	–	–	*	6.2	*	–	–	*
7.1	–	–	–	–	7.2	–	*	–	*
8.1	–	*	–	–	8.2	–	–	–	–
9.1	–	–	–	–	9.2	**	**	–	**
9.3	–	–	–	–	9.4	**	*	–	**
10.1	–	–	**	–	10.2	**	**	–	–

*$p < .10$

**$p < .05$

CHAPTER VI

A POSTERIORI TESTING

The purposes of the a posteriori analyses presented in this chapter are threefold. The first purpose is to examine subjects' cognitive structure scores when each role sample is divided by age, sex, or marital status. Age has already been shown to be related to cognitive structures with the teacher sample. The second aim is to examine the relationships between Zajonc's (1954) measures of cognitive structure and both Beiri's (1963) Role Rep Test (Rep Test) and Tuckman's (1966) Interpersonal Topical Inventory (ITI). The last two scales also purport to measure aspects of cognitive structure. Should measures be related, then a link to more recent thinking and measurement trends in the field of cognitive structure would be established. The final purpose of this chapter is to briefly examine subjects' Machiavellian scores and to look for possible predictors of these scores.

Demographic Variables and Cognitive Structure Scores

A posteriori tests were performed on cognitive structure scores whenever samples could be divided by age, sex, or marital status.

Age. Each role sample was split into two equal groups by employing the median age for that sample as the dividing point. These median age scores were as follows: control group,

19.75; teachers, 29.00; master's students, 32.00; doctoral students, 36.00; principals, 42.50; superintendents, 47.50. T-tests were carried out on each of the four morphological properties under both T- and R-tuning conditions using each pair of age groups. A summary of these analyses is presented in Table 29 (T-tuning) and Table 30 (R-tuning). Because of the positive and highly significant correlation coefficients found between variables employed in hypothesis testing (teaching and administrative experience) and age, it was felt that one-tailed tests of significance could be applied.

Few significant differences ($p < .10$) were found between younger and older subjects under conditions of T-tuning. Younger teachers scored significantly higher on Unity ($p = .024$), younger superintendents scored significantly higher on Differentiation ($p = .085$), and younger principals scored significantly higher on Complexity ($p = .037$) but significantly lower on Organization ($p = .101$) than their older counterparts. Results of correlational analysis using the age variable and each of the morphological properties supported these t-test analyses and indicated one additional significant finding -- a positive and significant relationship between the control group's Organization score and age ($r = .33$, $p = .002$).

With each of the three student samples and on all four cognitive structure properties under conditions of R-tuning, those students above the median age tended to score significantly higher than those students below the median age. However, the difference in scores on the Complexity and

TABLE 29

T-test Comparisons of Each Role Sample Classified by Those Above and Below the Median Age on the Four Cognitive Properties Under Conditions of T-tuning

Property	Below Median $\overline{X}$ Score	Above Median $\overline{X}$ Score	t	P (one-tailed)
Control				
D	9.45	9.14	0.46	.332*
C	22.16	20.89	0.64	.261
U	.29	.25	0.86	.196
O	20.12	22.98	-0.87	.195
MEd				
D	10.22	9.44	0.45	.330
C	24.89	23.11	0.36	.362
U	.33	.28	0.66	.260
O	21.53	17.67	0.54	.300
PhD				
D	8.83	9.33	-0.27	.398*
C	18.83	16.17	0.49	.318
U	.29	.23	0.47	.323
O	18.43	30.14	-0.75	.235

TABLE 29 (continued)

Property	Below Median $\overline{X}$ Score	Above Median $\overline{X}$ Score	t	P (one-tailed)
Teacher				
D	9.28	9.78	-0.60	.276*
C	21.67	22.83	-0.45	.317
U	.25	.17	2.05	.024
O	20.47	22.21	-0.57	.286
Principal				
D	9.43	8.57	1.00	.164
C	22.29	17.50	1.86	.037
U	.24	.22	0.49	.313
O	18.70	26.63	-1.27	.101*
Supt.				
D	10.80	9.40	1.00	.085
C	23.10	21.20	1.86	.221
U	.19	.24	-0.49	.216
O	28.87	29.59	1.27	.486*

*Welch correction.

TABLE 30

T-test Comparisons of Each Role Sample Classified by Those Above and Below the Median Age on the Four Cognitive Properties Under Conditions of R-tuning

Property	Below Median $\overline{X}$ Score	Above Median $\overline{X}$ Score	t	P (one-tailed)
Control				
D	7.57	8.50	-1.36	.089
C	16.80	19.84	-1.56	.062
U	.25	.29	-1.17	.123
O	14.47	16.84	-1.15	.128
MEd				
D	9.00	10.44	-1.08	.148
C	23.78	28.00	-0.84	.208
U	.24	.32	-1.08	.148
O	17.70	19.92	-0.51	.309
PhD				
D	8.00	9.83	-1.61	.069
C	16.17	23.67	-1.92	.042
U	.16	.21	-1.18	.133
O	17.90	22.87	-0.53	.307*

TABLE 30 (continued)

Property	Below Median $\overline{X}$ Score	Above Median $\overline{X}$ Score	t	P (one-tailed)
Teacher				
D	8.06	7.78	0.36	.362
C	18.11	18.06	0.02	.491
U	.22	.25	-0.57	.288
O	15.28	14.92	0.11	.459
Principal				
D	7.36	6.64	0.92	.184
C	17.86	14.57	1.26	.109
U	.27	.41	-2.21	.017*
O	14.22	10.72	1.43	.082
Supt.				
D	7.40	6.20	1.50	.076
C	15.10	12.10	1.56	.068
U	.22	.25	-0.48	.317
O	14.50	9.76	1.69	.054

*Welch correction.

Organization properties for master's students and the Organization property for doctoral students did not reach significance ($p < .10$).

Apart from the Unity property, the direction of differences in R-tuning scores for the principal and superintendent samples was in a reversed direction to that of the student samples; those above the median age tended to score significantly lower than those below the median age. On the Unity property, however, the older principals scored significantly higher than the younger principals. The differences in the scores on the Unity property for superintendents and the Differentiation property for principals did not reach significance ($p < .10$). There were no significant cognitive structure differences between older and younger teachers under R-tuning. No additional significant findings were indicated with correlational analyses.

Sex. As nearly all subjects in the principal, superintendent, master's student, and doctoral student samples were male, the t-test analyses using the sex variable were only carried out with the control and teacher samples. These last two samples were divided by sex and t-test analyses were employed on each of the four cognitive property scores under both T- and R-tuning. A summary of these analyses by sex is presented in Table 31. No significant differences were found in cognitive structure between males and females.

TABLE 31

T-test Comparisons of Control and Teacher Samples Classified by Sex on the Four Cognitive Properties Under Conditions of T- and R-tuning

Property	Male $\bar{X}$ Score	Female $\bar{X}$ Score	t	P (two-tailed)
Control				
T-tuning	(N = 42)	(N = 43)		
D	9.02	9.60	-0.87	.388
C	21.57	21.67	-0.05	.959
U	.27	.27	-0.08	.937
O	20.17	22.47	-0.70	.484
R-tuning	(N = 26)	(N = 46)		
D	7.88	8.04	-0.22	.824
C	18.23	18.11	0.06	.953
U	.29	.26	0.76	.956
O	15.01	15.81	-0.37	.711
Teacher				
T-tuning	(N = 25)	(N = 11)		
D	9.44	9.73	-0.32	.753
C	21.64	23.64	-0.76	.452
U	.21	.21	-0.18	.856
O	19.87	24.69	-1.49	.286
R-tuning	(N = 26)	(N = 10)		
D	7.85	8.10	-0.29	.772
C	17.73	19.00	-0.46	.649
U	.24	.23	0.29	.777
O	15.03	15.28	-0.07	.947

*Welch correction.

Marital status. Again, only the control and teacher samples were divided by marital status and *t*-test analyses employed on each of the four cognitive structure scores under both T- and R-tuning. A summary of the *t*-test analyses using the marital status variable is provided in Table 32. Findings indicate that married undergraduate students tended to score significantly higher ($p < .10$) than single undergraduate students on the Differentiation, Complexity, and Organization properties under both T- and R-tuning. Married teachers, on the other hand, tended to score significantly lower on Complexity ($p = .065$) and significantly higher on Unity ($p = .020$) than single teachers and only under conditions of T-tuning.

Summary. In general, higher cognitive structure scores on the Differentiation, Complexity, and Organization properties under T-tuning were obtained by married rather than single undergraduate education students. Under R-tuning, the older, married undergraduate and graduate students rather than the younger, single students, and the younger principals and superintendents rather than their older counterparts, scored higher on these three cognitive structure properties.

On the Unity property under T-tuning, the younger, married teachers scored higher than the older, single teachers. Under R-tuning, the older subjects in each sample scored higher on the Unity property than their younger counterparts.

TABLE 32

T-test Comparisons of Control and Teacher Samples
Classified by Marital Status on the Four Cognitive Properties
Under Conditions of T- and R-tuning

Property	Married $\overline{X}$ Score	Single $\overline{X}$ Score	t	P (two-tailed)
Control				
T-tuning	(N = 22)	(N = 63)		
D	10.27	8.98	1.71	.092*
C	24.64	20.57	1.85	.123
U	.24	.28	-1.05	.295
O	25.60	19.84	1.57	.121
R-tuning	(N = 14)	(N = 58)		
D	9.21	7.69	1.81	.075
C	21.43	17.41	1.55	.125
U	.19	.27	0.29	.773
O	21.28	14.54	1.97	.053
Teacher				
T-tuning	(N = 30)	(N = 6)		
D	9.43	10.00	-0.51	.615
C	21.43	26.33	-1.55	.131
U	.19	.30	-2.14	.040
O	21.28	21.66	-0.09	.926
R-tuning	(N = 34)	(N = 2)		
D	7.85	9.00	-0.68	.503*
C	17.82	22.50	-0.87	.389
U	.23	.31	-0.74	.464
O	15.20	13.39	0.24	.810

*Welch correction.

Relationship Among Cognitive Structure Measures

Seven measures of cognitive structure were obtained from subjects in the present study. These measures were Zajonc's four cognitive properties (Differentiation, Complexity, Unity, and Organization), Bieri's Role Rep Test (Rep Test),[16] and Tuckman's Interpersonal Topical Inventory (ITI). The last two scales were employed in order to discover if Zajonc's measures of cognitive structure were related to the more recent measurement trends in the field.

All subjects in the present study completed Zajonc's and Beiri's instruments, however, the time required to complete all questionnaires restricted completion of Tuckman's instrument to the control sample. The return rate of usuable ITI questionnaires was 71.3 per cent, that is, 112 of 157 control sample subjects. It was felt that this control group was large enough for comprehensive analysis of the various cognitive structure measures and in the following analysis it alone was employed.

The Pearson correlation coefficients and the associated probability levels from comparisons among the various cognitive structure measures for the total control group, and the total control group divided by T- and R-tuning, are summarized in Table 33. The ITI measure employed in these analyses is the ITI Score suggested by Gardiner (1968). As in the pilot study, a positive and highly significant relationship was found between ITI Score and ITI Type ($r = .76$, $p = .000$).

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[16] In the present study this test was called the C Scale (Appendix F).

TABLE 33

Correlation Coefficients and Associated Probability Levels from Comparisons Among Various Cognitive Structure Measures Under Conditions of T- and R-tuning

Property	REP TEST		ITI	
	r	P	r	P
Total Control Group				
D	.23*	.015	.03	.767
C	.31	.001	-.02	.851
U	.05	.576	-.13	.161
O	.16	.091	.05	.569
ITT	.08	.379		
T-tuning (N = 59)				
D	.21	.119	.14	.282
C	.31	.016	.08	.552
U	.03	.843	-.09	.501
O	.17	.202	.10	.458
ITI	.25	.056		
R-tuning (N = 53)				
D	.34	.014	-.04	.800
C	.37	.007	-.07	.613
U	.07	.617	-.24	.086
O	.25	.070	.11	.439
ITI	-.19	.179		

*The Rep Test is scored such that the lower subjects score the higher their cognitive complexity. For convenience, however, all signs have been reversed. This reversal is maintained throughout the study.

Results of correlational analyses using the various measures of cognitive structure indicate that, except for the tendency of the Unity property under R-tuning to be significantly and negatively related to ITI score ($r = -.24$, $p = .086$), none of Zajonc's measures were significantly related to the ITI measure. Rep Test scores, on the other hand, were found to be significantly and positively related to Zajonc's Complexity measure under both T-tuning ($r = .31$, $p = .016$) and R-tuning ($r = .37$, $p = .007$). Scores on the Rep Test were significantly and positively related to the Differentiation property under R-tuning ($r = .34$, $p = .014$) but only tended to be significantly related under T-tuning ($r = .21$, $p = .119$). Finally, Rep Test scores tended to be significantly and positively related to the Organization property under conditions of R-tuning ($r = .25$, $p = .070$). On the whole, it appears that there are significant and positive relationships between Bieri's Rep Test and Zajonc's Differentiation, Complexity, and Organization measures of cognitive structure. However, these relationships are more significant under R- than T-tuning.

The correlation coefficient between ITI and Rep Test scores employing the total control group was .08. This coefficient was not significant ($p = .379$). However, when correlation coefficients were calculated for subjects tested under conditions of T- and R-tuning, a positive and significant relationship was found under conditions of T-tuning ($r = .25$, $p = .056$) and a negative relationship was found under conditions of R-tuning ($r = -.19$, $p = .179$).

Employing the norms provided from 387 first year psychology students at the University of Alberta, seventy-five of the 112 subjects who completed the ITI could be classified by ITI Type, that is, System One, Two, Three, or Four. The four groups thus formed were used in analyses of variance based on each of the other cognitive structure measures. Table 34 summarizes the results of analysis of variance with the total group (N = 75) using the Rep Test scores. Table 35 summarizes the results of analyses of variance using Zajonc's cognitive structure properties under both T-tuning (N = 41) and R-tuning (N = 34).

Using a Newman-Keuls technique for comparing pairs of ordered ITI Type mean scores, it was found that: (1) on the Rep Test, System Two subjects scored significantly lower ($p < .05$) than Systems One, Three, and Four subjects; and (2) no significant differences existed among ITI types on any of Zajonc's cognitive structure properties under either T- or R-tuning.

It is of interest to note that System Two individuals, as compared to Systems One, Three, or Four individuals, tended not to reduce their T-tuning cognitive structure property scores under R-tuning.

Machiavellianism

The analysis and discussion of Hypothesis ten indicated that Machiavellian scores (Mach V) differed significantly across the role types employed in the present study. The analysis of variance of Mach V scores classified on the basis of the six

TABLE 34

Analysis of Variance of Rep Test Scores Classified on the Basis of the Four ITI Types

ITI Type	(n)	$\overline{X}$ Score	MS	F	P	Comparison Between Ordered Means
One	25	153.92	3169.67	2.84	.044	<u>2</u> <u>3 4 1</u>
Two	11	121.00	1114.18			
Three	20	146.65				
Four	19	153.79				

TABLE 35

Analyses of Variance of Zajonc's Cognitive Property Scores Under Conditions of T- and R-tuning Classified on the Basis of the Four ITI Types

ITI Type	$\overline{X}$ T-Score	(n)	$\overline{X}$ R-Score	(n)	MS	F	P
Differentiation							
One	9.47	17	7.38	8	0.78*	0.07	.974
Two	9.14	7	9.00	4	10.70		
Three	9.33	12	7.25	8	3.27**	0.72	.542
Four	10.00	5	7.93	14	4.48		
Complexity							
One	21.00		16.75		9.45*	0.11	.951
Two	21.71		21.50		82.78		
Three	20.75		15.50				
Four	23.40		17.79		33.84**	0.86	.470
					39.16		
Unity							
One	.22		.33		0.02*	0.98	.414
Two	.30		.26		0.02		
Three	.27		.26				
Four	.18		.26		0.01**	0.70	.560
					0.01		
Organization							
One	22.36		13.49		34.10*	0.20	.898
Two	18.12		17.13		173.96		
Three	20.79		14.26				
Four	19.35		16.34		21.18**	0.32	.808
					65.50		

*ANOVA for T-tuning data. **ANOVA for R-tuning data.

[illegible]

role types is reproduced below along with the results of a Newman-Keuls comparison among the ordered means of the classifications (Table 36).

The doctoral student sample was found to score significantly ($p < .05$) higher and the principal and superintendent samples were found to score significantly lower ($p < .05$) than all other samples in Machiavellianism.

Correlational (Table 37) and t-test (Table 38) analyses indicated that a number of demographic variables were related to subjects' Machiavellian scores: (1) except for the doctoral student sample, Machiavellianism tended to decrease with increased age; (2) Machiavellianism was negatively related to the years of administrative experience of principals ($r = -.18$, $p = .191$) and superintendents ($r = -.23$, $p = .152$); (3) single teachers scored significantly higher ($p = .032$) than married teachers on Machiavellianism; (4) Machiavellianism was positively related to doctoral students' teaching experience ($r = .48$, $p = .126$) but negatively related to master's students' teaching experience ($r = -.27$, $p = .116$).

Results of correlational analysis between Mach V and Rep Test scores for the total group and each of the six samples in the study indicated that a positive relationship existed between the two instruments; the higher a subject's Machiavellian score the greater his cognitive complexity. However, this relationship did not reach significance ($p < .10$) in the master's student, teacher, principal, and superintendent samples (Table 39).

TABLE 36

Analysis of Variance of Machiavellian Scores Classified on the Basis of the Six Role Samples and a Newman-Keuls Comparison Among the Ordered Means of the Classifications

Sample (#)	Sample Name	Sample (n)	$\overline{X}$ Mach Score	MS	F	P	Comparison Between Ordered Means
1	PhD	24	106.92	532.40	7.42	.000	<u>1</u> <u>2 3 4</u> <u>5 6</u>
2	MEd	36	103.22	71.78			
3	Teacher	72	103.08				
4	Control	157	102.53				
5	Principal	56	97.86				
6	Supt.	40	97.05				

TABLE 37

Correlation Coefficients and Associated Probability Levels from Comparisons Between Mach V Scores and Selected Demographic Variables

Sample		Demographic Variable					
		Age		Teaching Experience		Administrative Experience	
Name	(n)	r	P	r	P	r	P
Control	157	-.13	.115	.08	.341		
MEd	36	-.08	.658	-.27	.116	-.01	.943
PhD	24	.34	.349	.48	.126	.02	.553
Teacher	72	-.00	.980	.01	.916		
Principal	56	-.04	.787	.18	.173	-.18	.191
Supt.	40	-.13	.433	.17	.285	-.23	.152

TABLE 38

T-test Comparisons of Machiavellian Scores of Teacher and Control Samples Classified by Sex and Marital Status

Sample	$\overline{X}$ Score	$\overline{X}$ Score	t	P
Marital Status	Married	Single		
Teachers	(N = 64)	(N = 8)		
	102.20	110.12	-2.18	.032
Control	(N = 32)	(N = 125)		
	101.66	102.75	-0.67	.504
Sex	Male	Female		
Teachers	(N = 51)	(N = 21)		
	103.41	102.29	0.44	.713*
Control	(N = 68)	(N = 89)		
	103.31	101.93	1.04	.302

*Welch correction.

TABLE 39

Correlation Coefficients and Associated Probability Levels from Comparisons Between Mach V and Rep Test Scores for the Total Group and Each of the Six Samples

Sample	(n)	r	P
Total Sample	385	.11*	.033
Control	157	.13	.113
MEd	36	.11	.536
PhD	40	.34	.101
Teacher	72	.14	.254
Principal	56	.07	.617
Supt.	40	.06	.692

*See footnote Table 33 (p. 187).

CHAPTER VII

SUMMARY, CONCLUSIONS, DISCUSSION, AND IMPLICATIONS

I. SUMMARY

The Problem

This study has dealt with an investigation of the relationships that exist between administrative training, experience and personality variables, and the educational administrator's characteristics as a transmitter and receiver of communication. The relationships among a number of measures of cognitive structure and the manipulative tendencies of various educators has also been examined.

Hypotheses

The hypotheses involved in the study were that following the induction of cognitive tuning and with respect to each of four morphological properties of cognitive structures: (1) undergraduate education students (control group) would demonstrate differences in cognitive tendencies between Transmitting and Receiving (T-tuning or R-tuning) comparable to those of the sample used in Zajonc's (1954) original research; (2) teachers would score significantly higher under T-tuning but significantly lower under R-tuning than undergraduate education students; (3) more experienced teachers would score significantly higher under T-tuning but significantly lower under R-tuning than less experienced teachers; (4) principals would score significantly higher under T-tuning but

significantly lower under R-tuning than teachers; (5) superintendents would score significantly higher under T-tuning but significantly lower under R-tuning than principals; (6) more experienced principals would score significantly higher under T-tuning but significantly lower under R-tuning than less experienced principals; (7) more experienced superintendents would score significantly higher under T-tuning but significantly lower under R-tuning than less experienced superintendents; (8) doctoral sutdents in Educational Administration would score significantly lower under T-tuning but significantly higher under R-tuning than master's graduate students in Educational Administration; (9a) under T-tuning, doctoral students would score significantly higher than principals but significantly lower than superintendents, and master's students would score significantly higher than teachers but significantly lower than principals; (9b) under R-tuning, doctoral and master's students would score significantly higher than teachers, principals, or superintendents; (10) subjects High in Machiavellianism would score significantly higher under T- or R-tuning than subjects scoring Low in Machiavellianism.

Samples

Six samples were employed in the study. As all samples were selected on an intact group rather than random basis, the ability to generalize from samples required examination.

Control sample. The control group consisted of 157 University of Alberta undergraduate students enrolled in six

classes of Educational Administration 261. Intact group comparison indicated that classes were not significantly different from one another on the four cognitive structure properties. Also, because of the large number of subjects involved, the control sample was assumed to be representative of its population.

Teacher sample. The total teacher sample (N=72) contained subjects from three graduate Evening Credit Classes in Educational Administration at the University of Alberta, Edmonton, and an undergraduate Evening Credit Class in Educational Foundations conducted by the University of Alberta in Red Deer. These two intact groups of teachers (Edmonton and Red Deer) tended to differ from one another on three of the cognitive structure properties under conditions of R-tuning. Possible reasons for this discrepancy in cognitive structure scores were the greater proportion of males, of subjects with or working toward graduate degrees, and of subjects with aspirations to administrative positions in the Edmonton as compared to Red Deer R-group. Later analysis also indicated that high R-tuning scores were associated with graduate work in Educational Administration.

The teacher sample differed significantly from the Alberta population of teachers on all demographic variables examined. The sample tended to consist of married males, twenty-six to thirty years of age, with three to nine years of teaching experience, a large number of whom were working toward a graduate degree. The nonrepresentative nature of

the teacher sample must be considered a limitation of the study. However, it was suggested that as the teacher sample contained a large proportion of prospective educational administrators, it was of considerable interest for later analyses.

<u>Principle sample</u>. The principals employed in the study came from three sources: (1) an intact group attending a regular monthly meeting at the Edmonton Public School Board office (N=37); (2) an intact group attending a zone meeting of the Edmonton Separate School Board (N=11); (3) subjects attending the various Evening Credit Classes conducted by the University of Alberta (N=8). The small n's in groups other than that formed by the Edmonton Public School Board principals precluded any meaningful intact group comparisons. However, the combined principal sample was found to be highly representative of the Alberta population of principals.

<u>Superintendent sample</u>. Forty members of the Alberta School Superintendents' Association in attendance at the Annual Conference of School Superintendents, Consultants, Supervisors, and Inspectors, in Edmonton, volunteered to participate in the study. This superintendent sample was found to be representative of both the Albertan and Canadian populations of superintendents.

<u>Doctoral students in education administration sample</u>. The doctoral student sample contained all persons in the doctoral programme in Educational Administration at the University of Alberta in Edmonton (N=24). The small n's

involved in an analysis of intact groups of first and second year students precluded any meaningful intact group comparisons. However, because of the size of the sample relative to its population, the doctoral student sample was assumed representative of its population.

<u>Master's students in educational administration sample</u>. The master's student sample consisted of all individuals in the master's programme in Educational Administration at the University of Alberta in Edmonton (N=36). Only one intact group was involved. Because of the size of the sample relative to its population, the master's student sample was also assumed representative of its population.

Subjects in the Red Deer teacher, school board principal, superintendent, and graduate student groups were randomly assigned to either T- or R-tuning conditions. Evening Credit and control group classes were randomly assigned to T- or R-tuning conditions.

Instrumentation

Five instruments were used in the study. Data relating to subjects' cognitive structures under T- or R-tuning were gathered by means of Zajonc's methodology and instrumentation. Subjects were informed that they were participating in "a study of how groups operate under certain conditions." They were then given a letter to read with a time limit of two minutes and with the instruction to just "get a general idea of what sort of a person the writer is."

After reading the letter, subjects were told that the study was concerned with communication. In addition, the T-tuning group was told that they would be communicating the information they had obtained about the person who wrote the letter to another group; whereas the R-tuning group were told that another group with detailed information on the individual who wrote the letter would be communicating their information to the group.

Following the different instructions to the T- and R-tuning groups, all subjects were asked to put down the things they had "already learned about the writer from his letter." This reporting was to be completed on the instruments provided before actual transmission or reception of information. On separate cards, subjects first wrote down characteristics which they thought described the applicant. The total number of characteristics indicated a subject's Differentiation score. Second,subjects were asked to group their cards into "broad natural groupings" and then into a number of sub-groupings. The extent of such subdivision was used to obtain a subject's Complexity score. Finally, subjects were asked to examine the relatedness of the characteristics they had written by taking one characteristic at a time and listing which of their other characteristics would change if the chosen characteristic were "changed, absent, or untrue of the applicant." The more characteristics depended on each other the more cognitive structure was said to be Unified (Unity score). Also, to the extent that one or a cluster of

characteristics dominated the total number of characteristics, a subject's degree of Organization could be calculated (Organization score).

Two other measures of cognitive structure were obtained in the study: Bieri's Role Rep Test (Rep Test) and Tuckman's Interpersonal Tropical Inventory (ITI). These last two measures were used in order to examine relationships among a number of measures of cognitive structure and to link Zajonc's methodology and instrumentation to more recent measurement trends in the field.

The fourth instrument employed in the study was Christie's Mach V. Mach V was used to gather data on one aspect of a subject's personality, that is, the degree to which he manipulates others.

Finally, the fifth instrument used in the study was the Identification Data Sheet which sought demographic data relating to a subject's training and experience.

Related Research

Zajonc's (1954) research formed the basis for the study. His research indicated that the transmitting and receiving of communication lead to the arousal of different cognitive structures; transmitting results in predominantly rigid and specific structures considerably resistant to change, whereas receiving results in predominantly flexible and generalized structures readily susceptible to change. Given equal initial information, cognitive structures arising under transmitting conditions manifest higher differentiation,

complexity, organization, and unity than structures arising under receiving conditions. However, when individuals expect to deal with information which is contrary to their knowledge or beliefs, cognitive structures formed from this information show similar differentiation, complexity, organization, and unity whether transmission or reception is involved.

Among other research that was related to transmitting and receiving behavior was that concerned with the increased situational and individual complexity as one ascends an organizational hierarchy (Zajonc and Wolfe, 1963; Schroder, et al., 1967), the frequency of interaction among role types (Newcomb, 1963; Crocket, 1965; Wicker, 1969), and the need states of individuals at various levels in an organizational hierarchy (Von Fange, 1961; Porter, 1962; Carlson, 1962; Griffiths, 1965; Tronc, 1969; Hodgkinson, 1970; Theiman, 1970).

Results

Hypothesis testing. The undergraduate control sample was found to demonstrate similar differences in cognitive structures between T- and R-tuning conditions as Zajonc's (1954) original sample. Consistent with the pilot study results, however, no significant differences were found on the Unity property. The conclusion that, apart from the Unity property, Zajonc's results had been replicated permitted further analyses based on his theoroetical framework and methodology.

Contrary to what was hypothesized, there were no significant differences between teacher and control samples

on the properties of Differentiation, Complexity, or Organization under either T- or R-tuning. Also, contrary to expectation scores on the Unity property tended to decrease from the control to teacher samples. This decrease in Unity was explained in terms increased age. Correlational analysis, which indicated a negative relationship between Unity and each of the other three properties, provided additional information from which to discuss the tendency for differences in scores on the Unity property to act in a direction opposite to that hypothesized.

Teachers below the median years of teaching experience tended to score higher on Unity than those teachers above the median under T-tuning conditions. Apart from this finding with the Unity property, the hypothesis that teachers below the median years of teaching experience would score significantly higher on the cognitive properties than those above the median under T-tuning was not supported.

The hypothesis which indicated that under R-tuning the more experienced teachers would score significantly lower on the cognitive properties than the less experienced teachers was supported on the properties of Differentiation, Complexity, and Organization. As the correlational analysis would lead one to suspect, however, the more experienced teachers scored significantly higher than the less experiences teachers on the Unity property. Analyses of cognitive tuning scores of teachers by age and a comparison of these findings with the results using teaching experience indicated that increased

Unity for the more experienced teachers under conditions of T-tuning could also be accounted for by increased age. Under R-tuning, however, all differences on the cognitive properties, including Unity, were more likely to occur when the sample was analysed by teaching experience than by age.

The teacher T-tuning sample tended to score higher than the principal T-tuning sample on the Complexity property. On the whole, however, the hypothesis that principals would score significantly higher than teachers on the cognitive properties under T-tuning was not supported.

On the Complexity, Organization and, especially, Differentiation properties, the hypothesis that teachers would score higher than principals was supported. Again it was found that results on the Unity property were in a reverse-to-hypothesized direction.

The only consistent evidence (across a number of cognitive properties) of differences in cognitive structures between role types under T-tuning was indicated by a comparison of superintendent and principal samples. On the properties of Differentiation, Complexity, and Organization, superintendents tended to score significantly higher than principals, that is, in the hypothesized directions.

Under R-tuning, superintendents tended to score significantly lower on the Unity and Complexity properties than principals. Unity scores under T-tuning were very similar, but under R-tuning superintendents scored significantly lower than principals. As indicated in a following hypothesis

testing situation, the high Unity scores for principals under R-tuning could be attributed to those above the median years of administrative experience.

Not including the Organization property, the hypothesis that principals with more administrative experience would score higher in cognitive structure than the less experienced principals under T-tuning was not supported. On the organization propterty, there was a tendency for the difference in scores to fall in the hypothesized direction.

Under R-tuning, the Differentiation, Complexity, and Organization property scores of the more experienced principals tended to be significantly lower than these same scores for the less experienced principals, that is, in the hypothesized direction. Differences in Unity scores were reversed with more experienced principals scoring significantly higher than the less experienced principals. From an examination of the raw data, it appeared that the high mean Unity score for principals under R-tuning could be mainly attributed to four high scoring subjects.

No significant differences were found in cognitive structure between superintendents above and below the median years of administrative experience under conditions of T-tuning. It was concluded that the hypothesis suggesting that the more experienced superintendents would score significantly higher on the cognitive properties under T-tuning than the less experienced superintendents was not supported.

Under R-tuning, the more experienced superintendents scored lower than the less experienced superintendents on all

cognitive structure properties, but only differences on the Complexity and Organization properties approached significance. The hyposthesis that more experienced superintendents would score significantly lower on cognitive structure properties under R-tuning than the less experienced superintendents was thus only partly supported.

The direction of differences between doctoral and master's student cognitive structures under T-tuning conditions were consistent with Zajonc's (1954) "expectation of incongruent information hypothesis." Under T-tuning, doctoral students, when compared to master's students, scored lower on Differentiation, Complexity, and Unity, and higher on Organization. Under R-tuning, the direction of these differences was repeated. However, only differences on Complexity under T-tuning and Complexity and Unity under R-tuning reached significance. It was concluded that the hypotheses that doctoral students would score significantly lower under T-tuning and significantly higher under R-tuning than master's students were only partly supported. In addition, R-tuning scores of graduate students in Educational Administration were shown to have increased dramatically when compared to either other samples or to their respective T-tuning scores.

The hypotheses that under T-tuning conditions doctoral student cognitive structure scores would be significantly higher than principal but significantly lower than superintendent scores, and that master's students cognitive structure scores would be significantly higher than teacher but

significantly lower than principal scores, were not supported.

Under R-tuning, and on the properties of Differentiations, Complexity, and Organization, the hypotheses that doctoral and master's students would score significantly higher than principals and superintendents, and teachers and principals, respectively, was supported. On the Unity property, the doctoral students tended to score significantly lower than principals and superintendents, and master's students tended to score significantly higher than teachers but significantly lower than principals.

Taking into consideration all subjects tested, Machiavellian scores were found to be significantly and positively related to Unity scores under T-tuning and Differentiation and Complexity scores under R-tuning. However, as significant differences in cognitive structure had already been indicated among various role samples and as Machiavellian scores were also found to vary significantly across groups, some danger existed in interpreting these results solely in terms of Machiavellianism. An analysis of each role sample divided by those scoring above and those scoring below the median Machiavellian score (for each sample) indicated that significant differences were more likely to occur under T-tuning than R-tuning conditions. Machiavellianism was also found to affect differently the various role group's cognitive structure scores. Consistent evidence (over all cognitive structure properties) that a subject's Machiavellian tendencies affected his cognitive structures was only obtained with the teacher and principal samples and only under conditions

of T-tuning. The more Machiavellian teachers and principals were found to be more cognitively structured than the less Machiavellian teachers and principals.

A posteriori testing. A posteriori tests examined: (1) subjects' cognitive structure scores when each sample was divided by age, sex and marital status; (2) the relationships among the various measures of cognitive structure; (3) subjects' Machiavellian scores.

In general, married control subjects scored higher on the Differentiation, Complexity, and Organization properties than single control subjects under T-tuning. Under R-tuning, the older, married undergraduate and graduate students and the younger principals and superintendents scored higher on these three cognitive structure properties than their respective younger and single, or older, counterparts. On the Unity property under T-tuning, younger, married teachers scored higher than older, single teachers. Under R-tuning, older subjects in each sample scored higher on Unity than their younger counterparts.

Analysis of relationships among the various measures of cognitive structure indicated that: (1) except for the tendency of the Unity property under R-tuning to be significantly and negatively related to ITI score, there were no significant relationships between Zajonc's and Tuckman's measures; (2) significant and positive relationships existed between Zajonc's Differentiation and Complexity measures and Bieri's Rep Test; (3) the relationship between Tuckman's ITI

and Bieri's Rep Test was not significant when the total group was employed, however, the correlation coefficient calculated between these measures for subjects tested under conditions of T-tuning was significant and positive but under conditions of R-tuning the coefficient was negative; (4) subjects classified as System Two on the ITI scored significantly higher than subjects classified as Systems One, Three, or Four on Bieri's Rep Test, but no significant differences existed among ITI Types on any of Zajonc's cognitive structure measures. It was also noted that individuals classified as System Two on the ITI, as compared to individuals classified into the other Systems, tended not to reduce their T-tuning cognitive structure property scores under R-tuning.

Doctoral students scored significantly higher and principals and superintendents significantly lower than all other samples on the Mach V scale. Machiavellianism tended to decrease with increased age, increased administrative experience of principals and superintendents, increased teaching experience of master's students, and decreased teaching experience of doctoral students. Also, single teachers scored significantly higher than married teachers on the Mach V. A significant and positive relationship tended to exist between Mach V and Bieri's Rep Test scores, that is, the higher a subject's Machiavellianism the higher his cognitive complexity.

II. CONCLUSIONS

Before stating conclusions, it is customary to warn that results should not be generalized beyond the sample employed in the study. This position appears to lessen the impact of much applied research, such as that carried out in Educational Administration, for not only are generalizations impossible, but replication is made extremely difficult. The opposite point of view is taken in this study.

Although samples in the present study were not selected at random, every attempt was made to indicate the relationship of samples to populations. Five of the six samples in the study were shown not to differ significantly from their respective populations on a number of available demographic variables. It was concluded that these five samples were in fact representative of their populations and that inferences could thus be made from samples to populations. The teacher sample, however, was not found to be representative of its population on the demographic variables examined. Thus, in the case of the teacher sample, the customary warning that results should not be generalized beyond the sample must be applied. Detailed demographic information was provided on the teacher sample in order to facilitate replication.

Three main theoretical positions underlie much of the present study. These positions are: (1) "T-tuning versus R-tuning hypothesis," (2) "expectation of incongruent information hypothesis," and (3) "frequency of interaction

hypothesis." Each of these theoretical positions is discussed briefly below as it related to findings from the present study.

Zajonc's (1954) theory suggests that the expectation that one will transmit information and the expectation that one will receive information lead to the arousal of different cognitive structures. This position was strongly supported in the present study. Zajonc's theory was most strongly supported on the Differentiation, Complexity, and Organization properties. These three properties were highly and positively related to each other. On the Unity property, which was negatively but not highly related with each of the other three properties, results tended to be in a reversed to hypothesized direction. Under T-tuning, the decreasing Unity scores can, in part, be attributed to increased age. Under R-tuning, however, Unity increased with age, experience, and organizational position. There is little evidence in the literature with which to explore this last phenomenon.

The assumptions underlying differences between T- and R-tuning scores, that is, the need for rigid (unchanging) cognitive sets including both general and specific subsets in T-tuning and the need for flexible cognitive sets including general subsets in R-tuning, were not examined in the present study. These assumptions were assumed to have been adequately tested and supported by Zajonc (1954) and Cohen (1965).

Zajonc's also hypothesizes that the expectation of dealing with information which is contrary to one's knowledge

or beliefs negates differences between T- and R-tuning. This hypothesis was also reflected in the results of the present study. R-tuning scores were found to rise dramatically for those in graduate classes in educational administration or those undergraduates classifed as Systems Two on the Interpersonal Tropical Inventory (ITI). Persons classified as System Two on the ITI are characterized by uncertainty, rejection of traditional authority, and distrust of others. It was assumed that graduate students, in their interaction with peers, would be the most likely of all groups tested in the study to expect information contrary to their knowledge or beliefs.

As well as the hypothesis that persons expecting to deal with incongruent information would have similar T- and R-tuning scores, Zajonc postulated that these persons would, in comparison to those expecting to deal with congruent information, also have lower Differentiation, Complexity, and Unity, but higher Organization T-tuning scores. Zajonc's own research was consistent with this last postulate on the Differentiation, Complexity, and Organization properties but not on the Unity property. Zajonc (1960) comments on this finding with the Unity property:

> It may be assumed, therefore, that when dealing with incongruent information receivers protect themselves from unwanted changes by increasing unity, while transmitters because of their already high unity need not increase it (p.166).

In the present study and except for the Unity property, this last postulate only held for the doctoral student sample. Master's student's

T-tuning scores (incongruent condition), in comparison to undergraduate's or principal's T-tuning scores (congruent condition), were higher on Differentiation, Complexity, and Unity but lower on Organization. These opposite to hypothesized results under T-tuning suggest that other factors may be involved, for example, a subject's intelligence, age, and role, or varying degrees to which a subject feels the expectation of incongruent information. These factors were not examined in any depth in the present study.

Crockett's (1965) "frequency of interaction hypothesis" and its relationship to R-tuning behavior was also strongly supported in the present study. In hypotheses which involved teachers, principals, and/or superintendents, those subjects with more experience or in higher organizational positions, that is, those who interact most "frequently and intimately" with environmental objects or persons, were found to possess more flexible and general structures on the Differentiation, Complexity, and Organization properties. All of these comparisons were in the expected direction and eleven of fifteen comparisons were significant ($p < .10$).

As hypothesized, superintendents as compared to principals and the more as compared to the less experienced superintendents scored lower on the Unity property under R-tuning. Contrary to expectation, the less as compared to the more experienced teachers and principals, and teachers as compared to principals, scored lower on the Unity property under the same conditions. Other than the negative relationship

between Unity and the remaining three properties, little evidence could be found to explore these discrepant results.

Under T-tuning, the "frequency of interaction hypothesis" was only reflected in the superintendent and princpal comparison. Superintendents were found to score higher than principals on the Differentiation, Complexity, and Organization properties even though there was no difference on the Unity property. In other comparisons, the effects of tuning may have been sufficiently strong to be maintained despite role and experience factors.

Findings from comparisons of teacher, principal, and/or superintendent samples under conditions of T-tuning suggest that the quality or type of interaction is as important as the frequency of that interaction. This suggestion is clearly reflected in the similarity of teacher and principal T-tuning scores.

Conclusions which can be made as a result of the present study and which more closely relate to an administrator's experience, training, and personality as they affect communicative behavior, are arranged below under the headings of the major variables as they appear in the original statement of the problem. Conclusions involving the experience variable are divided into two; those involving teaching and administrative experience and those involving the different role types. Also, as a result of a posteriori testing, a number of conclusions were able to be made regarding (1) the relationships among cognitive structure measures, (2) Machiavellianism and (3) the instruments employed in the study.

Administrative Training

1. Being involved in graduate training in Educational Administration is significantly and positively related to increased rigidity in a subject's cognitive structures when preparing to receive information.

Experience

Role types

2. When preparing to transmit information, superintendents are significantly more differentiated, complex, and organized (that is, significantly more rigid) in their cognitive structures than principals, whereas principals tend not to differ in cognitive structures from teachers.

3. Teachers are significantly more rigid in their cognitive structures when preparing to receive information than principals and superintendents.

4. Principals tend to be more rigid in their cognitive structures when preparing to receive information than superintendents.

Teaching and administrative experience

5. Increased teaching experience for teachers is significantly and positively related to the possession of more flexible cognitive structures when preparing to receive information.

6. Increased administrative experience for both principals and superintendents tends to be significantly and positively related to the possession of more flexible cognitive structures when preparing to receive information.

Personality

7. Machiavellian tendencies are more likely to be aroused when preparing to transmit rather than to receive information.

8. Increased Machiavellianism for teachers and principals is significantly and positively related to the possession of more rigid cognitive structures when preparing to transmit information.

Cognitive Structure Measures

9. Differences in cognitive structures among various educators are more likely to occur under conditions of

preparing to receive than preparing to transmit information.

10. No consistent significant relationships exist between Zajonc's measures of cognitive structure and Tuckman's Interpersonal Topical Inventory.

11. A significant positive relationship exists betweem Zajonc's Differentiation and Complexity measures of cognitive structure and Bieri's Role Rep Test.

12. No consistent significant relationship exists between Tuckman's Interpersonal Topical Inventory and Bieri's Role Rep Test.

Machiavellianism

13. Principals and superintendents have significantly lower Machiavellian tendencies than teachers, undergraduate students in education, or graduate students in educational administration.

14. Doctoral students in educational administration have significantly higher Machiavellian tendencies than undergraduate students in education, master's graduate students in educational administration, teachers, principals, or superintendents.

15. No significant differences exist in Machiavellian tendencies among undergraduate students in education, master's graduate students in educational administration, and teachers.

16. A significant and positive relationship exists between Christie and Geis' Mach V Scale and Bieri's Role Rep Test, that is, the higher an individual's Machiavellian tendencies the higher his cognitive complexity.

Instruments

17. Both Zajonc's cognitive structure instrument and Christie and Geis' Mach Scale are significant additions in helping to find differences among various educators.

III. DISCUSSION AND IMPLICATIONS

Administrative Training

The conclusion that graduate students in educational administration have rigid cognitive structures when preparing

to receive information that are considerably resistant to change[17] is consistent with Zajonc's (1954) findings. Zajonc found that individuals preparing to deal with information contrary to their knowledge or beliefs show equal cognitive structure values whether transmitting or receiving of information is involved. This conclusion has some rather pressing implications for graduate training programmes in educational administration. If students are as inflexible in their cognitive structures when preparing to receive information as the results indicate, and if students spend a great deal of their time receiving information, then can it be expected that a graduate programme will have any effect in changing the way students perceive the field of educational administration? If the answer to this last question is no, and if changes in the way students perceive educational administration are desirable for the majority of students, then can a programme be provided in which students feel that their knowledge or beliefs are not being threatened? While not concerning themselves with this question directly, both Schroder et al. (1957) and Harrison (1966) have indicated that cognitive structures can be changed as a result of the type of training a trainee receives.

Experience

Role types. The second conclusion concerning teacher,

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[17]This rigidity was found to be especially acute for the older graduate students.

principal, and superintendent cognitive structures when preparing to transmit information is consistent with the position that frequent communicators become more alike (Newcomb, 1963; Festinger, 1957) and the research which indicates that principals spend much of their time in face-to-face communication with teachers (Anderson and Van Dyke, 1963). The influence of status differential, role identification, and different work experiences are apparently not stronger than common work experiences and communication frequency for teachers and principals. On the other hand, superintendents, having less frequency of contact with teachers than do principals, are less similar to teachers in cognitive structures than are principals.

The above discussion of teacher, principal, and superintendent cognitive structures when preparing to transmit information offers suggestions for the similarity of principal and teacher cognitive structures but does not indicate reasons for the significantly higher superintendent cognitive structure scores. Results with respect to the difference between principal and superintendent groups are, of course, consistent with Zajonc and Wolfe's (1966) findings that cognitive structure scores increase as one ascends the organizational ladder and the literature that suggests greater amounts of cognitive structure result for an individual from increased communication, responsibility, and environmental complexity in an organizational role (Wicker, 1969; Katz and Kahn, 1967).

Results under R-tuning do not at first glance appear

consistent with the above explanations. As conclusions two and three indicate, teachers, principals, and superintendents _differ_ in their cognitive structures when preparing to receive information; cognitive structures become less rigid from teachers to principals and then to superintendents. However, given the first conclusion regarding rigid cognitive structures for individuals involved in graduate work in educational administration and the fact that nearly half of the Edmonton intact teacher receiving group were taking graduate classes in educational administration, we would again expect teachers and principals to be similar in cognitive structures while superintendents would differ from both groups.

The implications of the above conclusions regarding the cognitive structures of teachers, principals, and superintendents for education in general depend on the connection between the cognitive structures of teachers and administrators and the learning experiences in the school as it affects the learners. If this connection exists, and both the frequency of communication explanation and the recent research by Joyce _et al_. (1966), Harvey _et al_. (1968), Hunt and Joyce (1967), and Murphy (1970) indicates it does, then a school staff's cognitive structure may have critical import for the learning accomplishments of individuals in the school context.

Cognitive structures are being developed as a result of the frequency of interaction, the complexity of the situation presented, and the models provided by teachers and administrators in the school situation. Thus, if the goal of

education is to produce individuals who are flexible, autonomous, creative, and critical (that is, more cognitive complex), and if certain teacher and administrator cognitive structures are more conducive to growth and development toward such qualities, then it would appear logical to employ the cognitive structure variable in selection procedures.[18] Also, as Murphy (1970) points out, certain questions concerning the professional preparation of teachers can be made. Murphy's contention is well taken when we realize that cognitive structures <u>can be changed</u> as a result of training and that in the present study there were no significant differences in cognitive structures between undergraduate education students and teachers in the field. More specifically, if it is accepted that categoric similarity results in more effective communication (Triandis, 1959; Runkle, 1956; Hunt, 1966; Hunt and Hardt, 1967), then the desirability of matching students and teachers and teachers and administrators on the cognitive structure variable is also implied.

Findings with regard to differences in cognitive structure when transmitting and receiving information for all but graduate educational administration students, and with regard to differences in cognitive structures under either T- or R-tuning among teachers and various administrators,

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[18] On the other hand, if the present teaching force is considered desirable and education undergraduates do not differ from these teachers, then the cognitive structure variable offers an important criterion on which to select desirable teachers.

have implications for supervisory behaviour. These implications are especially relevant for the interview situation. As Harris (1963) states:

> The supervisor who plans an interview in which his role will be that of transmitter will tend to see the classroom situation with considerable specificity. He will differentiate many items of information observed. His analysis will be very organized. If the supervisor anticipates negative reactions from the teacher, the organization of his information is likely to be even more rigorously analysed.
>
> . . . However, anticipated incongruence also tends to make the receiver more resistant to certain ideas which are presented. The effects of tuning where disagreements are not anticipated would appear to be more consistent with a constructive follow-up interview (p.407).

Harris (1963) maintains that many of the weaknesses in supervisors' observations may stem from the perception they have of their role in the interview situation.

> If a supervisor expects to be highly non-directive . . . he may not be tuned adequately for the most rigorous analysis of observation data. This is <u>not</u> to suggest that non-directive interview techniques are undesirable. But it does caution against a consequence that may be undesirable(p.407).

<u>Teaching and administrative experience</u>. Conclusions five and six state that increased teaching or administrative experience is significantly and positively related to the possession of more flexible cognitive structures when an individual is preparing to receive information. Other results indicate that when preparing to transmit information, experience is not related to cognitive structures.

The strong effect of teaching experience in contributing to more flexible cognitive structures under R-tuning appears to be further illustrated by the fact that the

age analyses indicated no significant differences in cognitive structures between older and younger teachers. However, this lack of significant differences with the age variable may also have been a result of the sample employed and the narrowness of the age range involved.

Conclusions with respect to increased flexibility in cognitive structure when preparing to receive information as a result of (1) increased teaching or administrative experience and (2) ascention in an organizational hierarchy are in a "desirable" direction. Hyman and Sheatsley (1947), for example, identify the major types of factors which prevent effective communication as a lack of attention, awareness and interest, selective interpretation, and rigidity of attitudes.

Personality

Conclusion seven states that Machiavellian tendencies are more likely to be aroused when preparing to transmit than to receive information. This conclusion is consistent with Christie and Geis' (1970) argument that Machiavellianism is more likely to be displayed in situations where subjects interact face-to-face with others and when the situation provides latitude for improvisation. It was suggested that transmission as compared to reception of information is more likely to involve face-to-face interaction and latitude for improvisation.

Conclusion six, indicating that a subject's Machiavellian score is related to his cognitive structure score, implies that personality variables are related to cognitive

structures. Further research employing a number of personality measures is of course implied.

Cognitive Structure Measures

Little evidence is available from the literature to help explore the conclusion that differences in cognitive structures among educators are more likely to occur under conditions of preparing to receive than preparing to transmit information. Either the prospect of transmitting information is strong enough to make all educators similar in their cognitive structures even though differences may exist, or there are in fact no differences in cognitive structures among various educators. Evidence with respect cognitive structures when preparing to receive information offers support for the former of these two positions.

This conclusion with respect to the likelihood of differences in cognitive structure among educators under transmission conditions is contrary to Zajonc and Wolfe's (1966) findings. These authors found that as position in the hierarchy of an organization increased so did cognitive structure scores. However, when comparing Zajonc and Wolfe's findings with those of the present study, it must be borne in mind that subjects in Zajonc and Wolfe's study did not possess equal information for determining cognitive structure scores.

Conclusions with respect to relationships among the various measures of cognitive structure imply that Zajonc's and Bieri's instruments measure dimensional complexity, whereas Tuckman's inventory measures some other aspect of

cognitive structure, most probably that of integrative complexity. Contrary to Harvey's (1963) findings, and if Tuckman's inventory does indeed measure integrative complexity, there appears to be a limited relationship between dimensional and integrative complexity.

However, if a relationship does exist between Bieri's and Tuckman's scales, and if Bieri's scale is accepted as a valid measure of cognitive structure, then there is not a linear relationship from Tuckman's Systems One through Four using cognitive structure scores. This last result not only calls into question Gardiner's (1968) scoring method for the ITI, but also the results of research employing Systems One and Systems Four subjects and assuming a linear relationship between them.

The finding that System Two individuals on the ITI, as compared to Systems One, Three, and Four individuals, tend not to reduce their T-tuning cognitive structure scores under R-tuning, suggests an area of further research: are graduate students taking educational administration more likely than other educators or education graduate students to be classified as System Two individuals on the ITI?

The different results obtained when ITI scores were correlated with Rep Test (C Scale) scores under T- and R-tuning poses an interesting question for questionnaire research studies: When subjects are completing questionnaires for research projects are they preparing to transmit or preparing to receive information? Depending on a subject's cognitive set it appears that different results will occur and, if the

present study is any indication, "more" results are likely if they are preparing to receive information.

The difference indicated between transmission and reception tuning has implications for change studies such as those involving attitude change. The usual procedure in these studies is to take a pre-test measure, apply the experimental manipulation, and then take a post-test measure to determine the extent of change. As Zajonc (1954) also points out, one important feature omitted in such designs is related to the process of cognitive tuning. It is usually assumed that experiemental manipulation attacks directly the attitude to be changed and that the structure of the attacked attitude is exactly the same as that evident from the pre-test attitude measure. Two different sets of conditions, however, appear present here. In answering an attitude questionnaire, the subject has the anticipation of transmitting information to others. Immediately before the experimental manipulation, the subject has the anticipation of receiving information. The first condition results in a subject tuning in a cognitive set which will allow him to transmit information whilst the second condition results in a cognitive set to enable him to receive information. As the present study indicates, these two types of tuning lead to two differently structured cognitive sets. Thus, if the manipulation given with the hope of changing an attitude does not attack the attitudinal structure which has been elicited by the measure, but a different reorganized one, then the effectiveness and process of

attitude change must be understood in a somewhat different light. This then implies that in change and questionnaire studies the researcher must know the exact state of subjects' cognitive structures.

Machiavellianism

The significantly lower Machiavellian scores for principals and superintendents and significantly higher scores for doctoral students are consistent with both Christie and Geis' (1970) finding that Machiavellianism decreases with age and the theory and research indicating that as one climbs the organizational ladder the desire for upward mobility decreases the need states change from those concerned with the physiological, security, social, and esteem to those concerned with autonomy and self-actualization (Theiman, 1970; Porter, 1962; Maslow, 1954).

The finding that Machiavellianism tends to decrease with age was consistent with Christie and Geis' (1970) results. However, the following results were contrary to those reported by Christie and Geis (1970): (1) the significant and positive relationship between Mach V scores and Bieri's Rep Test (C-Scale) which indicates that the greater an individual's Machiavellian tendencies the higher his cognitive complexity; (2) male teachers and undergraduate education students were not significantly more Machiavellian than their female counterparts; (3) those who spent more of their time with others in a formal set of roles, that is, principals and superintendents,[19] were not more likely to be Machiavellian than those

[19] It could be argued that doctoral students spend more of their time with others in a formal set of roles than the other samples tested. If this is the case, then Christie and Geis' contention would hold.

who did not; (4) single teachers were significantly more Machiavellian than married teachers.

The relative infancy of research employing the Mach V scale may have contributed to the inconsistencies noted above in results from different studies. However, because of its infancy, the numerous significant results obtained with the measure in the present study, and the empirical, descriptive, and intuitive links of Machiavellianism to administration, further research with the Mach V in the field of administration is implied. One profitable direction for this research might be to explore the relationship between administrative effectiveness and Machiavellian tendencies of administrators. Christie and Geis (1970) have speculated on what type of Machiavellian would make a good administrator:

> In general, our observations and theoretical position suggest that anyone extremely low on Mach would make a poor administrator. He would be too likely to become affectively involved with those whom he was presumably supervising and lack the detachment necessary to depersonalize his relationships with them when a cognitive analysis of the situation was necessary. . . .
>
> The problem with extremely high-Mach administrators is that their cool cognitive analysis of the need of the organization coupled with a disregard for the individual needs of those within it could quite easily lead to disaffection and problems of morale which can cripple the organization.
>
> The problem then becomes what the mission of the organization is and how its structure is related to its internal and external needs. In a rapidly expanding or in a fairly stable one that is changing its relationship to external organizations, relatively high-Mach executives should be more useful and successful. . . . A low Mach administrator in such a situation would (hypothetically, at least) not be nearly as adept in bargaining for the benefit of the organization in the outside world.

> If we were dealing with a tightly structured system in which role relationships and administrative procedures were clearly laid out and the problem was the maintenance of the organization, a high-Mach administrator might well feel stifled . . . .
>
> A moderately low Mach, e.g., one who is concerned with others but does not get too sucked into interpersonal involvements would probably be much better at keeping the system operative at the optimal level.
>
> In summary, our speculations about the relative ability of high and low Machs to fit into administrative positions is that very low Machs are probably poor bets for any administrative position in a loosely structured organization; very high Machs are poor bets for most tightly structured organizations except when they are sent on what amounts to detached service in which there is freedom to wheel and deal to both their own and the organization's benefit (pp.357-8).

Instruments

Given the fact that in previous studies few significant differences have been indicated when comparing educators, and the fact that significant differences were found among educators on the Mach V scale and Zajonc's various measures, then both instruments and the variables they measure provide important additions for the study of education and educators.

There also exist the possibility that Zajonc's descriptive properties could be used for the description of other wholes, for example, for the description of information and the way it is transmitted (that is, the networks employed) or the description of groups and their structure and organization. Katz and Kahn's (1967) discussion of the coding process tends to agree with this possibility:

> Individuals, groups, and organizations share a general characteristic which must be recognized as a major determinant of communication: the coding process. Any system which is the recipient of information has a characteristic

> coding process, a limited set of coding categories to which it assimilates the information received (p. 227).

In all cases, the major problem of employing Zajonc's properties for the description of other wholes lies in deciding what are the basic elements involved. For some purposes one could use individuals as the basic components of the structure, for others roles, positions, or functions could be used. Once the components are defined, however, it should not be too difficult to determine the degree of differentiation, complexity, unity, and organization of the phenomena.

Further, if cognition is regarded as it was in the present study, that is, as achieved information, then information is always potential cognition. Therefore, if information is potential cognition, it can be described in the same way that cognition is described. Research could now explore, for example, whether highly unified messages result in highly unified cognitive sets or whether transmission and reception is facilitated if information has one or another type of structure. Roger's (1962)work with the diffusion of innovations and the perceived characteristics of innovations that aid in the adoption process appears to be along these lines.

One drawback of Zajonc's methodology is that it involves a single cognitive experience of a single individual reacting to a single object. Although this would seem to be the logical first requirement of a theory of cognition it should, in the ideal, eventually be capable of describing any cognitive experience of any individual reacting to any object.

On the other hand, to the extent that one takes an empiricist rather than a nativist approach to the origins of cognition the more one believes that modes of organization are built up through specific experiences and into a number rather than one general domain. Therefore, it would be possible for an individual to maintain conceptual frameworks concerning different aspects of professional activities that are structurally quite different. This last position may help to explain why Zajonc and Wolfe's (1966) research was successful in finding differences in cognitive structures among subjects at various levels in the hierarchy of an industrial firm when based on formal but not informal communication.

No matter whether a nativist or an empiricist approach is taken to cognition, at this point in time there remains a need to repeat studies such as the present one but employing various objects or stimuli. Crockett (1965), for example, cites research by Supnick indicating that more attributes are given when the person being judged is a peer, liked, and of the same sex as the subject, than when the person is older than the subject, disliked, and of a different sex. Of course, the object employed need not be another person, it could just as easily be the organization in which the subject works.

Also, by varying the person or group which subjects would be required to transmit information to or to receive information from, greater depth could be attained in cognitive structure research. In the present study, transmission and reception was to or from peers. However, Cohen (1965) suggests

that Zajonc's results might not hold true if the individual to whom subjects would have to transmit information was a respected, well-informed person who was neutral or opposed to the individual on the issue. On the other hand, Cohen suggests that transmission to people who are relatively uninformed, or who are interested in finding out only the gist of something with no regard for evaluating it, might show predicted effects.

To conclude, previous research has indicated that effective communication is positively related to successful administrative behaviour in the schools (Guetzkow, 1951; Bidwell, 1955; Chase, 1953; Moyer, 1953; Pierce and Merrill, 1957; Prince, 1957). On the other hand, the present study has provided a more basic understanding of the communication process as it relates to the cognitive structures of actual and potential educational administrators. It has been demonstrated that because organizational positions supply their occupants with differential opportunities for reception processing and transmission of information, and because these positions are held by persons with varying amounts of training and experience, varying need states,and varying personalities, the cognitive structures tuned in by these individuals in coping with information will reflect the communication demands and opportunities of the position and the differences in training, experience, needs, and personalities.

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APPENDICES

APPENDIX A

PILOT STUDY

In the two week period between November 30 and December 14, 1970, data for a pilot study were gathered. It was decided to carry out a pilot study in order to determine:

1. The suitability of Zajonc's instrument in terms of
   a) directions,
   b) letter content, and
   c) replication of results.
2. The suitability of the Information Data Sheet.
3. Test-retest reliability (stability) of the Attitude Scale (MACH V) and the Interpersonal Topical Inventory (ITI).
4. The ability to generalize results obtained from an intact group.
5. The extent of correlations between scales, in particular, the correlations between
   a) the ITI Type and the ITI Score,
   b) the ITI and Zajonc's instrument,
   c) the ITI and the MACH V, and
   d) Zajonc's instrument and the MACH V.
6. If there was any preliminary support for the position that training (in this case a comparison between first year undergraduates and after-degree students at university) affects performance on

Zajonc's instrument.

The data obtained is summarized in Table 1.

All subjects were students at the University of Alberta, Edmonton, Alberta. Undergraduate groups were intact classes of Educational Administration 261 and After-Degree groups were intact classes of Educational Administration 461.

Analysis of the pilot study data and observations made by both the experimental subjects and the researcher during the administration of the various instruments led to the following results.

The Suitability of Zajonc's Instrument

Directions. Confusion was evident in the first administration of Zajonc's instrument from subjects' responses to the directions in Part II (the Complexity measure). This confusion stemmed from two sources: (1) doubt over the meaning of "letter of the characteristic" and (2) doubt over the directions for arranging and recording groups and subgroups. It was found in later administrations of the instrument that by placing the letters "A" to "Z" in alphabetical order on the blank cards employed in the exercise and by modifying the directions and layout this confusion was overcome. (Appendix C).

Letter content. One or two comments were made by subjects regarding the content of the letter used in the exercise, that is, the letter originally used by Zajonc. These comments referred to the dates employed (born 1935, high school graduation 1952, and so on) and the amount of

TABLE 1

Data Collected for Pilot Study

Subjects		Zajonc's Instrument		MACH V	ITI		Informa-
Classification	N	Transmitting	Receiving		Type	Score	tion Data Sheet
Undergraduate							
Class A*	34	X		X	X	X	X
Class B	27	X					X
Class C	21		X				X
Class D	28		X	X	X	X	X
After-Degree							
Class E	22	X		X	X	X	X
Class F	18		X	X	X	X	X

*Twenty-nine subjects from Class A were readministered the MACH V and the ITI two weeks after their initial testing.

salary requested (forty-five dollars per week) by the author of the letter. In addition, it was possible that there could have been some question as to the relevance of the United States content in the letter. These factors, that is, the dates, salary, and American content, may have affected responses in a way different to Zajonc's results. The Differentiation scores, for example, may have been higher for the pilot study subjects, especially those subjects preparing for Transmission tuning. The reason for these higher scores could be attributed to the specifity in the letter being more noticeable to Canadian subjects in 1970. Zajonc (1960) emphasizes that transmitters do in fact employ a higher proportion of specific attributes from the letter than receivers:

> The attributes of all Ss were coded for specificity by two independent judges. . . . The reliability measure in percent agreement was 82%. The results indicate that the transmitters' cognitive structures had on the average 57.5% specific attributes, while those of the receivers, only 32.6%. This difference was significant at the .001 level (p.163).

On the other hand, the lack of familiarity with the places mentioned in the letter may have had a reverse effect on subjects' responses, thus depressing the Differentiation scores. It is realized that the effects of the letter content are difficult to ascertain from responses, however, a content analysis of the characteristics used by subjects in Classes B, C, and E indicated a minimal effect in terms of the number of characteristics that could be specifically attributed to the dates, salary, or American content of the letter (for example,

"Works for meager wages" or "Born 1935 in N.J."). This effect was greater for the transmitting classes (Class B had four characteristics specifically attributed to dates, salary, or Amercian content and Class E seven such characteristics) than for the receiving class (Class C had one such characteristic).

In order to give respondents as similar an experience as possible to Zajonc's original sample, it was decided to modify the letter. To this end, dates, salary, and vacation time were updated, and names were changed to fit the Canadian context. In this modification every attempt was made to equate such content as distances, town and college size, names, and so on, with the original letter. A copy of the modified letter can be found in Appendix B.

Replication of Zajonc's results. Except for the Unity property of cognitive structure analysis of the data from the total sample and the undergraduate classes[1] by Transmitters and Receivers indicates similar results to those obtained by Zajonc.[2] The results with the Unity property, although not significant, tend to be in the reverse direction to those attained by Zajonc.

As a result of the above observations and analyses, Zajonc's instrument was considered suitable for purposes of the present study.

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[1]The undergraduate classes more closely resemble the subjects employed in Zajonc's original study.

[2]See Table 2.

TABLE 2

Differences Between T- and R-tuning Scores in Zajonc's and the Pilot Study

Property	Zajonc's Sample (N = 45)			Total Pilot Sample (N = 147)			Undergrad Pilot Sample (N = 107)		
	Mean Score T-group	Mean Score R-group	t	Mean Score T-group	Mean Score R-group	t	Mean Score T-group	Mean Score R-group	t
Differentiation	7.90	5.12	5.67***	9.51	7.67	4.09***	9.40	7.45	3.69***
Complexity	17.80	9.32	6.83***	20.89	16.00	3.86***	20.53	15.76	3.27***
Unity	0.309	0.222	2.19*	0.26	0.29	-1.32	0.26	0.30	-1.35
Organization	13.75	8.40	2.94**	18.42	14.21	3.00**	18.68	13.31	3.31***

*$p < .05$

**$p < .01$ Unless indicated all significance levels are for two-tailed tests.

***$p < .001$

<u>The Suitability of the Information Data Sheet</u>

With minor modifications the Identification Data Sheet was found quick and simple to administer and at the same time provided all the required data. A copy of the modified data can be found in Appendix D.

<u>Stability of MACH V and ITI</u>

Twenty-nine subjects from Class A were readministered the MACH V and the ITI instruments two weeks after their initial testing. Coefficients of stability were calculated for each of the scales in the MACH V and the two methods of scoring the ITI. These coefficients are reported in Table 3. Each coefficient is highly and significantly different from zero.

The test-retest analyses shown in Table 3 offer support for Christie's and Tuckman's contentions that the MACH V and the ITI, respectively, are reliable and consistent.

<u>The Ability to Generalize Results from Intact Groups</u>

As it is the intention to use intact groups in the present study, rather than randomly selecting subjects, some evidence pertaining to the generality of results from intact groups was thought desirable. Comparisons (*t*-tests) were carried out between the two intact undergraduate classes that acted as transmitters (Classes A and B) and between the two intact undergraduate intact classes that acted as receivers (Classes C and D). If these intact groups were from the same population then no significant differences would be

TABLE 3

Test-Retest Reliabilities of MACH V and ITI

Instrument	N	r	P
MACH V			
Social Desirability	(29)	.73	.000
Machiavellianism	(29)	.77	.000
ITI			
Type	(22)	.82	.000
Score	(29)	.77	.000

expected on the various properties of cognitive structure as measured by Zajonc's instrument. As the results in Table 4 indicate, this was the case.

As a result of the group comparisons shown in Table 4, some evidence was provided to support the position that inferences can be made in the present study from non-random but intact groups of subjects.

Correlations between Scales

ITI Type and ITI Score. In order to find support for the use of Gardiner's (1968) scoring method for the ITI, a product-moment correlation coefficient was calculated between ITI Scores and ITI Types. The advantage of using the ITI Score lies in the fact that all subjects can be employed in analyses. This is not always the case with the ITI Type where, on the average, almost one-third of subjects are not found classifiable into an ITI Type and thus cannot be used in analyses.

Results of the comparison between the ITI Score and ITI Type, $r = .74$, were highly significant (p.000).[3] Both the results of this comparison of the ITI Score with the ITI Type and the high test-retest reliability of the ITI Scores found earlier ($r = .77$, $p = .000$) provide support for the use of the ITI Score in the present study.

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[3]This result was from Class A only. A later analysis with all subjects completing the ITI (N=105) produced a product-moment coefficient of .59 ($p < .001$).

TABLE 4

Intact Group Comparison on T- and R-tuning Scores

Property	Undergraduate Pilot Sample: Transmitting, Class A Mean Score	Transmitting, Class B Mean Score	t	Receiving, Class C Mean Score	Receiving, Class D Mean Score	t
Differentiation	9.00	9.82	-0.994	7.36	7.57	-0.348
Complexity	19.17	22.00	-1.292	15.64	15.90	-0.141
Unity	0.27	0.25	0.643	0.31	0.29	0.534
Organization	17.52	19.93	-0.971	13.24	13.41	-0.085

ITI[4] and Zajonc's instrument. Part of the proposed research involves relating Zajonc's measures of cognitive structure to the more recent measures in the field. The ITI was selected as one of the more recent measures of cognitive structure. The pilot study afforded an opportunity to obtain preliminary data on the direction of the relationship between Zajonc's measure and the ITI. The product-moment correlations given in Table 5 provide only limited evidence of any relationship between the two measures of cognitive structure.

The results of the comparison between scores on the ITI and Zajonc's measures of cognitive structure suggest: (1) a negative relationship between abstract thinking and Differentiation, and abstract thinking and Complexity, and (2) a positive relationship between abstractness and Unity (for those subjects with greater training). This latter relationship may be a function of age.[5] These relationships

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[4]All analyses with the ITI have employed the ITI Score.

[5]Observation of the means of ITI Type One (Concrete) transmitters, Type One receivers, Type Four (Abstract) receivers, and Type Four transmitters suggests that a subject's ITI score may also be affected by environmental factors. Comparison of the transmitting means indicates a similar direction to that found with the correlation analyses, however, under condition of receiving, the direction of the differences in results is not nearly so clear. The Differentiation (D), Complexity (C), and Organization (O) pairs of means become almost identical and the Unity (U) means reverse their direction, that is, Unity increases as Concreteness increases.

In addition, observation of the ITI Type One male and the ITI Type Four male data is relevant for the study because the majority of subjects are male. D, C, and O means all increased, whereas the U means decreased, between "concrete" (Type One) and "abstract" (Type Four) subjects.

It was not the purpose of the pilot study to analyse these last findings, but merely to make the researcher aware of the variables that may affect the major study and its results.

TABLE 5

Correlations Between Scores on Zajonc's Measures and the ITI

Property	Total Pilot Sample Completing ITI and Zajonc's Instrument (N = 105)	Undergraduate Pilot Sample Completing ITI and Zajonc's Instrument (N = 65)	After-Degree Pilot Sample Completing ITI and Zajonc's Instrument (N = 40)
Differentiation	-.10	-.12	-.05
Complexity	-.13*	-.11	-.13
Unity	.01	-.11	.23*
Organization	-.05	.01	-.10

*$p < .10$ (One-tailed)

between the ITI and Zajonc's instrument, although small, suggest the possibility that the measures of Differentiation and Complexity are related to the dimensional aspect of cognitive structure, whereas the measure of Unity is related to the integrative aspect of cognitive structure. The high and positive correlation (.93) between Differentiation and Complexity scores helps to emphasize the dimensional nature of Zajonc's Complexity measure.[6]

ITI and MACH V. An analysis of pilot sample data comparing scores on the ITI and MACH V resulted in a product-moment coefficient of only .08. However, as Christie (1970) has indicated, Machiavellians "make out better (p.85)" under certain conditions. Thus, it may be that conditions of transmitting and receiving affect the results of the comparisons between ITI and MACH V scores.[7] Further comparisons were made between ITI and MACH V scores dividing the sample into transmitters and receivers. These latter comparisons indicated a product-moment coefficient of -.03 (N=49) with receiving data and a coefficient of .21 (N=56) with transmitting data. The transmitting data coefficient, which was significant at the .05 level, suggests that as a subject

[6]The complete inter-correlation table for Zajonc's properties of cognitive structure was as follows:

	D	C	U	O
D	1.00			
C	.93	1.00		
U	-.10	-.02	1.00	
O	.65	.60	-.43	1.00

[7]The mean MACH score for transmitters (N=56) was 10.61 and for receivers (N=49) 9.76. The t value was 1.80 ($p < .04$ one-tailed).

increases in abstract thinking he also increases in Machiavellianism.

Zajonc's instrument and MACH V. Results of an analysis comparing scores on Zajonc's instrument and the MACH V produced the following product-moment coefficients:

Differentiation	.08
Complexity	.02
Unity	.18
Organization	-.08

Only the result of the comparison of the Unity property with Machiavellianism was found to be significantly different from zero ($p < .10$). A reanalysis of data by transmitters and receivers did not produce different results from those obtained with the total sample.

Effects of Training on Zajonc's Instrument

In order to discover whether there was support for the position that a subject's training affects performance on Zajonc's measures of cognitive structure, undergraduate and after-degree subjects' scores, classified by those who completed the exercise under conditions of transmitting or conditions of receiving, were compared. The results of these comparisons offer tentative support for position that training increases scores on Differentiation, Complexity, and Organization, and decreases scores on Unity. This is shown in Table 6.

All of the comparisons are in the expected direction.

TABLE 6

Comparison of Undergraudate and After-Degree Sample T-R-tuning Scores

Property	Transmitting				Receiving			
	Class A	Class E	t	p	Class C	Class F	t	p
Differentiation	8.56	9.82	-1.705	.05	7.10	8.28	-1.808	.04
Complexity	18.00	21.82	-1.805	.04	14.84	16.67	-0.908	.18
Unity	.27	.25	0.436	.33	.31	.26	0.918	.18
Organization	17.14	17.72	-0.257	.40	12.75	16.65	-1.747	.04

Four of the eight comparisons are significantly different ($p \leqslant .05$, one-tailed) from zero. It is realized that these results are only tentative in nature. Other variables, as shown in Table 7, may have an important affect on the results.

Conclusion

The proposed study could be considered experimental in nature. Only a limited number of studies exist that have sought differences between those individuals who become educational administrators (at various levels) and those who remain as teachers. Also, to a certain degree, the study will be hypotheses-generating. Before hypotheses can be tested concerning relationships between personality characteristics and occupational role behavior, it is necessary to first ascertain whether distinctive personality characteristics exist for the occupational groups of concern.

A pilot study was carried out in order to provide evidence concerning the applicability of the variables chosen and the instruments employed to measure these variables, the value of intact groups (as opposed to purely random samples), and the possibility of giving direction to hypotheses. Findings from the pilot study suggest the feasibility of further study.

TABLE 7

Comparisons of Transmitting and Receiving Classes on Selected Demographic Variables

Characteristic	Transmitting				Receiving			
	Class A	Class E	t	p	Class C	Class F	t	p
Age	22.35	24.82	-1.331	.09	18.77	22.28	-6.777	.00
Sex (M=1,F=2)	1.59	1.41	1.307	.10	1.58	1.44	0.910	.18
Marital Status (S=1 , M=2)	1.21	1.55	-2.748	.00	1.03	1.28	-2.654	.02
Yrs at University	0.62	4.09	-24.208	.00	0.56	4.17	-34.394	.00

APPENDIX B

March 26, 1969

Dear Sir:

I would like to apply for a job with your firm. A friend of my father's told me that there might be a position vacant in your office for a mail clerk, and if this were so I would be interested in taking it.

I am about to complete my first year of college, but because of financial difficulties I cannot continue my studies. This is the reason why I am seeking employment at this time. I was born in Vancouver, B.C. in 1951. After finishing elementary school I attended the David Thompson High School in Vancouver, and graduated in 1968. During the summer of 1968 I attended a Banff Music Camp. I played with a High School orchestra there, and my professors were very satisfied with my work. In September 1968 I enrolled as a freshman to St. Andrews College in Saskatoon, Sask., were I am presently majoring in music. My special interest is piano, but I have done some work with other instruments, too.

I realize that my musical interests will not guarantee me a job, but I understand that you are a staunch admirer of seventeenth century music, and that is why I thought I'd mention it. My clerical experience is rather meagre, although I have already held several jobs. In 1964 I was a helper with the Spargo Grocery in Vancouver. My duties there consisted of delivering packages to customers, packing, and running other errands. Unfortunately, because of ill health I had to interrupt my work with Mr. Spargo, and when I got better, the job was taken by someone else. The year after I found work as a waiter with Joe's Diner in Coquitlam, B.C., a few miles from Vancouver. I stayed there almost a year working half-time, while simultaneously attending high school.

After I entered St. Andrews College I have held also various jobs. Among others, I was a dishwasher at the dormitory, delivery boy for a local paper, and did odd jobs for the Grounds Superintendent at the College. These are most of my qualifications from the point of view of my experience. I admit there is not very much, but then again, the work of a mail clerk does not require a great deal either. I may mention that I am generally regarded as an intelligent and trustworthy person, I like to do my work dilligently, and I respect my superiors. If I did take the job, I must warn you that there exists a possibility that I might have to complete some army training, which will, of course, interrupt my employment. I hope, however, that the Army will exempt me from service because of my poor health.

If you wish references, I might list Mr. K. Scanlon, who is a mutual friend of your and my fathers'. I might also mention Mr. L. Spargo the owner of Spargo Grocery, 54th Ave. and Victoria Drive in Vancouver, B.C., and Dr. H.T. Green, my professor at the College. I have not asked them specifically, but I am sure that if you write to them, they would be glad to tell you about me. I would expect about $85 per week, as well as three weeks vacation every year. If you think that there is a possibility of my working for your firm, and if you can promise some possibility for future advancement, I would appreciate if you would write me as soon as possible.

Sincerely yours,

APPENDIX C

PART I

Detach the stack of cards from this booklet.

On each card separately write one characteristic which descibes the applicant. You can put down whatever comes to your mind, since there is no one list of characteristics that can be considered as either "correct" or "incorrect". Everyone of us sees things in a slightly different way.

You may have too many or too few cards, but this shouldn't bother you. Put down as many characteristics as you feel are necessary to describe the applicant adequately. There is no fixed number of characteristics that is either "correct" or "incorrect". If you use only two cards then lay the remaining ones aside. If, on the hand, you happen to run out of cards, you will be supplied with some more.

Work rapidly.

PART II

Lay out in front of you all the cards you used for listing the characteristics of the applicant.

Then, procede as follows:

1. Look the cards over carefully and notice whether they fall into some broad natural groupings. If they do, arrange them into such groups.
2. In the spaces provided below list the characteristics that you have placed in each group. (Use the letter printed on each card for this listing.) Any single group may have one, some, or all of your characteristics contained within it.
3. Now, look at your groups one by one and see whether these can be broken down into subgroups. If they can, separate the cards accordingly.
4. In the spaces provided below list the characteristics that you have placed in each subgroup. (Use the letter printed on each card for this listing.)
5. It is possible that your subgroups can be broken down further. If this is so, indicate below by placing a circle around characteristics that form groupings within subgroups.

Check to see whether all the characteristics were included. It is important that you do not omit any of them in your groupings.

Letters of characteristics in:

GROUP I	GROUP II	GROUP III	GROUP IV	GROUP V	etc...

Letters of characteristics in subgroups:

PART III

It is possible that some of the characteristics are related to one another. They may depend on one another in such a way that if one changes, the other ones would change too. Suppose the table in front of you was bigger than it is now. Then it would also become heavier. This means that the weight of the table depends on its size.

The relationships between the characteristics you put down may not be so obvious and so simple, but try to decide whether such relationships exist nevertheless. To do this first lay out your cards in front of you in alphabetical order (use the letter printed on each card for this arranging), and then follow the procedure below.

LIST ALL THE CHARACTERISTICS WHICH WOULD CHANGE IF CHARACTERISTIC "A" WERE CHANGED, ABSENT, OR UNTRUE OF THE APPLICANT:

LIST ALL THE CHARACTERISTICS WHICH WOULD CHANGE IF CHARACTERISTIC "B" WERE CHANGED, ABSENT, OR UNTRUE OF THE APPLICANT:

LIST ALL THE CHARACTERISTICS WHICH WOULD CHANGE IF CHARACTERISTIC "C" WERE CHANGED, ABSENT, OR UNTRUE OF THE APPLICANT:

LIST ALL THE CHARACTERISTICS WHICH WOULD CHANGE IF CHARACTERISTIC "D" WERE CHANGED, ABSENT, OR UNTRUE OF THE APPLICANT:

LIST ALL THE CHARACTERISTICS WHICH WOULD CHANGE IF CHARACTERISTIC "E" WERE CHANGED, ABSENT, OR UNTRUE OF THE APPLICANT:

LIST ALL THE CHARACTERISTICS WHICH WOULD CHANGE IF CHARACTERISTIC "F" WERE CHANGED, ABSENT, OR UNTRUE OF THE APPLICANT:

LIST ALL THE CHARACTERISTICS WHICH WOULD CHANGE IF CHARACTERISTIC "G" WERE CHANGED, ABSENT, OR UNTRUE OF THE APPLICANT:

LIST ALL THE CHARACTERISTICS WHICH WOULD CHANGE IF CHARACTERISTIC "H" WERE CHANGED, ABSENT, OR UNTRUE OF THE APPLICANT:

LIST ALL THE CHARACTERISTICS WHICH WOULD CHANGE IF CHARACTERISTIC "I" WERE CHANGED, ABSENT, OR UNTRUE OF THE APPLICANT:

"J"

"K"

"L"

"M"

"N"

"O"

"P"

"Q"

"R"

"S"

"T"

"U"

"V"

"W"

"X"

"Y"

"Z"

LIST ALL THE CHARACTERISTICS WHICH WOULD CHANGE IF CHARACTERISTIC "AA" WERE CHANGED, ABSENT, OR UNTRUE OF THE APPLICANT:

. . . ETC.

APPENDIX D

IDENTIFICATION DATA SHEET

Please complete the following. All information will be regarded as confidential and reports of the study will be in terms of groups rather than individuals.

All of the data requested below are vital to this study so your your cooperation would be greatly appreciated.

Age:_____ Sex: M__ F__ Marital Status: S__ M__ Other___

Present Position: Please check one only. (Graduate students also circle position held prior to entry into your present program.)

Undergraduate Student _____
Graduate Student _____
Teacher _____
Department Head _____
Vice-Principal _____
Principal _____
Supervisor _____
Superintendent _____
Other (Please specify)_____ ________________

Total number of years of teaching experience: __________

Total number of years of administrative experience (Please specify): __________

Numer of years of professional preparation:

Undergraduate _____
Graduate (Masters) _____
Graduate (Doctorate) _____
Other (Please specify)_____ ________________

Do you aspire to an administrative position in a school or a school system ? Yes __ No __

If you do aspire to an administrative position, what type of position is it?

Department Head _____
Vice-Principal _____
Principal _____
Supervisor _____
Superintendent _____
Other (Please specify)_____ ________________

In your present position as a student, teacher, or administrator what do you consider to be the extent of:

	Never	Seldom	Sometimes	Often	Always
Face-to-face contact with others					
Opportunity for improvisation					
Affectively complex situations					

APPENDIX E

S. A. SCALE

Directions:

You will find 20 groups of statements on the next page. Each group lists 3 opinions -- not matters of fact -- about people or things in general. There are no 'right' or 'wrong' answers, and different people will agree (or disagree) with different ones.

Read all 3 statements in each group before marking anything. Then, first put a plus sign (+) next to the one you agree with most or that is most true.

After that, put a zero (0) next to the statement of the two left that is most false or that you disagree with most.

For example:

____ A. It is easy to persuade people but hard to keep them persuaded.
__+__ B. Theories that don't agree with common sense are a waste of time.
__0__ C. It is sensible to go along with what other people are doing and not be too different.

You can see that the person answering felt that B was most true (or he agreed with it most). And he did not agree with A and C as much. But C was the one he disagreed with most (or felt was least true).

You will find some choices easy to make. Others will be harder. But do not fail to make a choice in every case, no matter how hard.

You will mark 2 of the three statements in each group--but please put no mark next to the remaining statement.

Do not omit any groups of statements!

If any questions come up, please ask the instructor giving out the questionnaire.

Think about your answers, but work as quickly as possible, please.

1.____A. It takes more imagination to be a successful criminal than a successful business man.

____B. The phrase, "the road to hell is paved with good intentions" contains a lot of truth.

____C. Most men forget more easily the death of their father than the loss of their property.

2.____A. Men are more concerned with the car they drive than with the clothes their wives wear.

____B. It is very important that imagination and creativity in children be cultivated.

____C. People suffering from incurable diseases should have the choice of being put painlessly to death.

3.____A. Never tell anyone the real reason you did something unless it is useful to do so.

____B. The well-being of the individual is the goal that should be worked for before anything else.

____C. Since most people don't know what they want, it is only reasonable for ambitious people to talk them into doing things.

4.____A. People are getting so lazy and self-indulgent that is is bad for our country.

____B. The best way to handle people is to tell them what they want to hear.

____C. It would be a good thing if people were kinder to others less fortunate than themselves.

5.____A. Most people are basically good and kind.

____B. The best criteria for a wife or husband is compatibility — other characteristics are nice but not essential.

____C. Only after a man has gotten what he wants from life should he concern himself with the injustices in the world.

6.____A. Most people who get ahead in the world lead clean, moral lives.

____B. Any man worth his salt shouldn't be blamed for putting his career above his family.

____C. People would be better off if they were concerned less with how to do things and more with what to do.

7.____A. A good teacher is one who points out unanswered questions rather than gives explicit answers.

____B. When you ask someone to do something, it is best to give the real reasons for wanting it rather than giving reasons which might carry more weight.

____C. A person's job is the best single guide as to the sort of person he is.

8.____A. The construction of such monumental works as the Egyptian pyramids was worth the enslavement of the workers who built them.

____B. Once a way of handling problems has been worked out it is best to stick to it.

____C. One should take action only when sure it is morally right.

9.____A. The world would be a much better place to live in if people would let the future take care of itself and concern themselves only with enjoying the present.

____B. It is wise to flatter important people.

____C. Once a decision has been made, it is best to keep changing it as new circumstances arise.

10.____A. It is a good policy to act as if you are doing the things you do because you have no other choice.

____B. The biggest difference between most criminals and other people is that criminals are stupid enough to get caught.

____C. Even the most hardened and vicious criminal has a spark of decency somewhere within him.

11. ___A. All in all, it is better to be humble and honest than to be important and dishonest.
___B. A man who is able and willing to work hard has a good chance of succeeding in whatever he wants to do.
___C. If a thing does not help us in our daily lives, it isn't very important.

12. ___A. A person shouldn't be punished for breaking a law that he thinks is unreasonable.
___B. Too many criminals are not punished for their crimes.
___C. There is no excuse for lying to someone else.

13. ___A. Generally speaking, men won't work hard unless they are forced to do so.
___B. Every person is entitled to a second chance, even after he commits a serious mistake.
___C. People who can't make up their minds are not worth bothering about.

14. ___A. A man's first responsibility is to his wife, not his mother.
___B. Most men are brave.
___C. It's best to pick friends that are intellectually stimulating rather than ones it is comfortable to be around.

15. ___A. There are very few people in the world worth concerning oneself about.
___B. It is hard to get ahead without cutting corners here and there.
___C. A capable person motivated for his own gain is more useful to society than a well-meaning but ineffective one.

16. ___A. It is best to give others the impression that you can change your mind easily.
___B. It is a good working policy to keep on good terms with everyone.
___C. Honesty is the best policy in all cases.

17. ___A. It is possible to be good in all respects.
___B. To help oneself is good; to help others even better.
___C. War and threats of war are unchangeable facts of human life.

18. ___A. Barnum was probably right when he said that there's at least one sucker born every minute.
___B. Life is pretty dull unless one deliberately stirs up some excitement.
___C. Most people would be better off if they control their emotions.

19. ___A. Sensitivity to the feelings of others is worth more than poise in social situations.
___B. The ideal society is one where everybody knows his place and accepts it.
___C. It is safest to assume that all people have a vicious streak and it will come out when they are given a chance.

20. ___A. People who talk about abstract problems usually don't know what they are talking about.
___B. Anyone who completely trusts anyone else is asking for trouble.
___C. It is essential for the functioning of a democracy that everyone vote.

APPENDIX F

C. SCALE

I. In the spaces provided below place the initials of the persons who best fit each of the ten role descriptions.

For example:

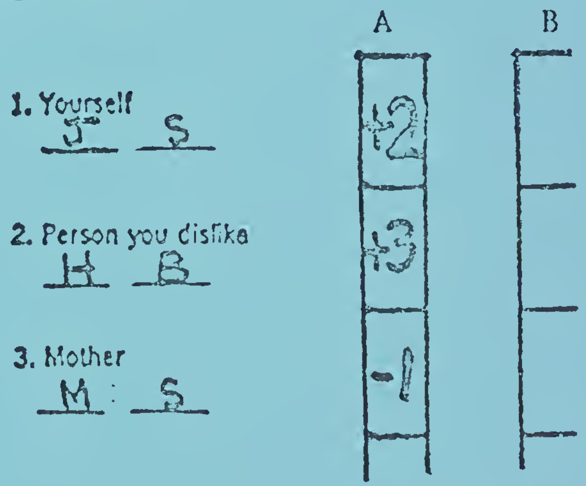
If your name (1) was Joe Smith and the person you dislike (2) was Harry Brown, you would have

. . . and so on to role No. 10.

II. Now look at the scale for Column A (found at the base of column A) and rate each of the ten persons you chose according to the given dimension.

For example:

If you consider yourself (1) as moderately outgoing, the person you dislike (2) as very outgoing, and your mother (3) as slightly shy, you would have



. . . and so to role No. 10.

III. Look at the scale for column B and rate each of the ten persons you chose according to the given dimension.

IV. Repeat this procedure for all columns (A to J). For each new column make sure that you are aware of the dimension at the base of that column.

	A	B	C	D	E	F	G	H	I	J
1. Yourself										
2. Person you dislike										
3. Mother										
4. Person you'd like to help										
5. Father										
6. Friend of same sex										
7. Friend of opposite sex (or spouse)										
8. Person with whom you feel most uncomfortable										
9. Boss										
10. Person difficult to understand										

	+3	+2	+1		−1	−2	−3	
A	+3	+2	+1	outgoing / shy	−1	−2	−3	
B	+3	+2	+1	adjusted / maladjusted	−1	−2	−3	
C	+3	+2	+1	decisive / indecisive	−1	−2	−3	
D	+3	+2	+1	calm / excitable	−1	−2	−3	
E	+3	+2	+1	interested in others / self absorbed	−1	−2	−3	
F	+3	+2	+1	cheerful / ill humored	−1	−2	−3	
G	+3	+2	+1	responsible / irresponsible	−1	−2	−3	
H	+3	+2	+1	considerate / inconsiderate	−1	−2	−3	
I	+3	+2	+1	independent / dependent	−1	−2	−3	
J	+3	+2	+1	interesting / dull	−1	−2	−3	

APPENDIX G

T INVENTORY

Instructions:

On the pages that follow there are 36 pairs of responses. There are six pairs to each set.

Please select one response from each pair, the one that more accurately shows your opinion or feeling.

Record your choice by circling A or B.

Be frank and indicate, in each case, your true feeling or opinion or the reaction which you would actually make in the situation. DO NOT INDICATE HOW YOU SHOULD FEEL OR ACT; rather indicate how you DO feel or act.

Make sure you are aware of the situation or topic that each set of responses refers to. You will find the situation or topic appearing at the top of that set. Each set has a different situation or topic at the top.

1. Note the situation or topic at the top of the set.

2. Answer that set by selecting one response from each of the six pairs on that set.

3. Record your choices by circling the letter (A or B) that corresponds to each choice.

4. Go to the next set and note the situation or topic at the top of that set. Answer this set as you did the first. Continue in this way to the end of the 36 pairs.

Do not omit any pairs of statements!

If any questions come up, please ask the instructor giving out the questionnaire.

Work at your own rate of speed but work straight through the inventory without stopping. Once you have completed a set DO NOT RETURN TO IT.

1. Imagine that someone has criticized you. Choose the response from each pair that comes closest to your feelings about such criticism. Indicate your choice by marking either "A" or "B" in each pair.

WHEN I AM CRITICISED . . . A	Pair No.	B
I try to take the criticism, think about it, and value it for what it is worth. Unjustified criticism is as helpful as justified criticism in discovering what other people's standards are.	(1)	I try to accept the criticism but often find that it is not justified. People are too quick to criticize something because it doesn't fit their standards.
I try to determine whether I was right or wrong. I examine my behavior to see if it was abnormal. Criticism usually indicates that I have acted badly and tends to make me aware of my own bad points.	(2)	It could be possible that there is some misunderstanding about some thing I did or said. After we both explain our viewpoints, we can probably reach some sort of compromise.
I listen to what the person says and try to accept it. At any rate, I will compare it to my own way of thinking and try to understand what it means.	(3)	I feel that either I'm not right, or the person who is criticizing me is not right. I have a talk with the person to see what's right or wrong.
I usually do not take it with good humor. Although, at times, constructive criticism is very good, I don't always think that the criticizer knows what he is talking about.	(4)	At first I feel that it is unfair and that I know what I am doing, but later I realize that the person criticizing me was right and I am thankful for his advice. I realize that he is just trying to better my actions.
I try to ask myself what advantages this viewpoint has over mine. Sometimes both views have their advantages and it is better to combine them. Criticism usually helps me to learn better ways of dealing with others.	(5)	I am very thankful. Often I can't see my own errors because I am too engrossed in my work at the time. An outsider can judge and help me correct the errors. Criticism in everyday life usually hurts my feelings, but I know it is for my own good.
It often has little or no effect on me. I don't mind constructive criticism too much, but I dislike destructive criticism. Destructive criticism should be ignored.	(6)	I try to accept and consider the criticism. Sometimes it has caused me to change myself; at other times I have felt that the criticism didn't really make much sense.

2. Imagine that you are in doubt. Choose the response from each pair that comes closest to your feelings about such doubt. Indicate your choice by marking either "A" or "B" in each pair.

WHEN I AM IN DOUBT . . . A		B
I become uncomfortable. Doubt can cause confusion and make one do a poor job. When one is in doubt he should ask and be sure of himself.	(7)	I find myself wanting to remove the doubt, but this often takes time. I may ask for help or advice if I feel that my questions won't bother the other person.
I don't get too upset about it. I don't like to ask someone else unless I have to. It's better to discover the correct answer on your own.	(8)	I usually go to someone who knows the correct answer to my question. Sometimes I go to a book which will set me straight by removing the doubt.
I first try to reason things out and check over the facts. Often I approach others to get ideas that will provide a solution.	(9)	I think things over, ask questions, and see what I can come up with. Often several answers are reasonable and it may be difficult to settle on one.
I realize that I'll have to decide on the correct answer on my own. Others try to be helpful, but often do not give me the right advice. I like to judge for myself.	(10)	I usually try to find out what others think, especially my friends. They may not know the answer, but they often give me some good ideas.
I look over the problem and try to see why there is doubt. I try to figure things out. Sometimes I just have to wait awhile for an answer to come to me.	(11)	I try to get some definite information as soon as possible. Doubt can be bad if it lasts too long. It's better to be sure of yourself.
I consider what is best in the given situation. Although one should not rush himself when in doubt, he should certainly try to discover the right answer.	(12)	I act according to the situation. Sometimes doubt can be more serious than at other times and many of our serious doubts must go unanswered.

3. Imagine that a friend has acted differently towards you. Choose the response from each pair that comes closest to your feelings about such an action. Indicate your choice by marking either "A" or "B" in each pair.

WHEN A FRIEND ACTS DIFFERENTLY TOWARD ME . . .		
A		B
I am not terribly surprised because people can act in many different ways. We are different people and can't expect to understand all his reasons for acting in different ways.	(13)	I am usually somewhat surprised but it doesn't bother me very much. I usually act the way I feel toward others. People worry too much about others' actions and reactions.
I find out why. If I have done something wrong I will try to straighten out the situation. If I think he's wrong, I expect him to clear things up.	(14)	I feel that I may have caused him to act in a different way. Of course, he may have other reasons for acting differently which would come out in time.
I first wonder what the trouble is. I try to look at it from his viewpoint and see if I might be doing something to make him act differently toward me.	(15)	It is probably because he has had a bad day, which would explain this different behavior; in other cases he may just be a changeable kind of person.
It is probably just because something is bothering him. I might try to cheer him up or to help him out. If these things didn't work I would just wait for him to get over it.	(16)	I try to understand what his different actions mean. I can learn more about my friend if I try to figure out why he does things. Sometimes the reasons may not be very clear.
There has to be a definite reason. I try to find out this reason, and then act accordingly. If I'm right I'll let him know it. If he's wrong, he should apologize.	(17)	I usually let him go his way and I go mine. If a friend wants to act differently that's his business, but it's my business if I don't want to be around when he's that way.
I don't get excited. People change and this may cause differences. It is important to have friends, but you can't expect them to always be the same.	(18)	I like to get things back to normal as soon as possible. It isn't right for friends to have differences between them. Whoever is at fault should straighten himself out.

4. Think about the topic of people in general. Choose the response from each pair that comes closest to your thoughts about people. Indicate your choice by marking in either "A" or "B" in each pair.

THIS I BELIEVE ABOUT PEOPLE . . .		
A		B
Whatever differences may exist between persons, they can usually get along if they really want to. Although their ideas may not agree, they probably still have something in common.	(19)	People can learn from those who have different ideas. Other people usually have some information or have had some experience which is interesting and can add to one's knowledge.
People can act in all sorts of ways. No single way is always best, although their ideas may not agree, they probably still have something in common.	(20)	Each person should be able to decide the correct thing for himself. There are always a few choices to be made and the indiviudal himself is in the best position to pick the right one.
Some people think they know what's best for others and try to give advice. These people shouldn't make suggestions unless asked for help.	(21)	There are certain definite ways in which people should act. Some don't know what the standards are and therefore need to be straightened out.
I can tell if I am going to get along with a person very soon after meeting him. Most people act either one way or another and usually it is not difficult to say what they like.	(22)	It's hard for me to say what a person is like until I've known him a long time. People are not easy to understand and often act in unpredictable ways.
People have an outside appearance that usually isn't anything like what can be found on the inside, if you search long and hard enough.	(23)	Each person is an individual. Although some people have more good or bad points than others, no one has the right to change them.
People can be put into categories on the basis of what they're really like. Knowing the way a person really is helps you get along with him better.	(24)	People are unlike one another in many respects. You can get along with people better and better understand them if you are aware of the differences.

5. Think about the general topic of leaders. Choose the response from each pair that comes closest to your thoughts about leaders. Indicate your choice by marking in either "A" or "B" in each pair.

LEADERS . . . .

A		B
Leaders do not always make the right decisions. In such cases, it is wise for a man to look out for his own welfare.	(25)	Leaders are necessary in all cases. If a leader cannot make the right decision another should be found who can.
Leaders cannot provide all the answers. They are like other people -- they have to try to figure out what action is necessary and learn from their mistakes.	(26)	Leaders make decisions sometimes without being sure of themselves. We should try to understand this and think of ways to help them out.
I like a leader who is aware of how the group feels about things. Such a leader would not lead any two groups in exactly the same way.	(27)	A person should be able to put his confidence in a leader and feel that the leader can make the right decision in a different situation.
There are times when a leader shouldn't make decisions for those under him. The leader has the power to decide things, but each man has certain rights also.	(28)	A leader should give those under him some opportunity to make decisions, when possible. At times the leader is not the best judge of a situation and should be willing to accept what others have to say.
Some leaders are good, others are quite poor. Good leaders are those who know what is right for the man under them. These leaders deserve the respect of every man.	(29)	Leaders cannot be judged easily. Many things go to make up good leadership. Most people fall short in some way or another, but that is to be expected.
Leaders are needed more at certain times than others. Even though people can work out many of their own problems, a leader can sometimes give valuable advice.	(30)	Some people need leaders to make their decisions. I prefer to be an individual and decide for myself, when possible. Most leaders won't let you do this.

6. Imagine that someone has found fault with you. Choose the response from each pair that comes closest to your feelings about such a situation. Indicate your choice by marking in either "A" or "B" in each pair.

WHEN OTHER PEOPLE FIND FAULT WITH ME . ... .

A		B
It means that someone dislikes something I'm doing. People who find fault with others are not always correct. Each person has his own ideas about what's right.	(31)	It means that someone has noticed something and feels he must speak out. It may be that we don't agree about a certain thing. Although we both have our own ideas, we can talk about it.
I first wonder if they are serious and why they have found fault with me. I then try to consider what they've said and make changes if it will help.	(32)	If enough people point out the same fault, there must be something to it. I try to rid myself of the fault, especially if the criticizers are people "in the know".
They have noticed something about me of which I am not aware. Although criticism may be hard to take, it is often helpful.	(33)	They are telling me something they feel is correct. Often they may have a good point which can help me in my own thinking. At least it's worthwhile to consider it.
I may accept what is said or I may not. It depends upon who is pointing out the fault. Sometimes it's best to stay out of sight.	(34)	I accept what is said if it is worthwhile, but sometimes I don't feel like changing anything. I usually question the person.
I like to find out what it means; since people are different from one another, it could mean almost anything. A few people just like to find fault with others but there's usually something to be learned.	(35)	There is something to be changed. Either I am doing something wrong or else they don't like what I am doing. Whoever is at fault should be informed so that the situation can be set straight.
I don't mind if their remarks are meant to be helpful, but there are too many people who find fault just to give you a hard time.	(36)	It often means that they're trying to be disagreeable. People get this way when they've had a bad day. I try to examine their remarks in terms of what's behind them.

PLEASE MAKE SURE YOU HAVE CIRCLED 36 STATEMENTS